

**EPA Superfund
Record of Decision:**

**SYOSSET LANDFILL
EPA ID: NYD000511360
OU 01
OYSTER BAY, NY
09/27/1990**

THE MAGOTHY AND THE RARITAN FORMATION. THE UPPER GLACIAL FORMATION IS UNSATURATED IN THE VICINITY OF THE LANDFILL. THE SATURATED PORTION OF THE MAGOTHY FORMATION (MAGOTHY AQUIFER) IS THE PRINCIPAL SOURCE OF WATER FOR PUBLIC AND INDUSTRIAL USE; THEREFORE, THIS IS THE AQUIFER OF INTEREST.

#SHEA

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

THE LANDFILL IS OWNED BY THE TOWN OF OYSTER BAY (THE "TOWN"), WHICH OPERATED IT FROM APPROXIMATELY 1933 TO 1975. BETWEEN 1933 AND 1967, NO RESTRICTIONS WERE IMPOSED ON THE TYPES OF WASTES ACCEPTED AT THE LANDFILL. WASTE TYPES INCLUDED COMMERCIAL, INDUSTRIAL, RESIDENTIAL, DEMOLITION, AND AGRICULTURAL WASTES, AS WELL AS, SLUDGE MATERIAL AND ASH. IN 1967, WITH THE OPENING OF ANOTHER LANDFILL TO THE EAST OF SYOSSET IN OLD BETHPAGE, THE TOWN STOPPED USING THE LANDFILL FOR THE DISPOSAL OF ITS DOMESTICALLY GENERATED WASTES. THE TOWN ALSO DIRECTED SOME INDUSTRIAL GENERATORS TO USE THE OLD BETHPAGE FACILITY, BUT SOME INDUSTRIAL WASTES CONTINUED TO BE DISPOSED OF AT THE LANDFILL UNTIL IT WAS CLOSED. THE LANDFILL ALSO ACCEPTED SCAVENGER CESSPOOL WASTE.

THE LANDFILL WAS EXCAVATED INTO TWO CELLS TO A DEPTH OF APPROXIMATELY 60 TO 90 FEET BELOW LAND SURFACE, AND WAS THEN BACKFILLED WITH GARBAGE. THERE IS ALSO EVIDENCE THAT BURIED COMBUSTIBLE FILL MATERIALS WERE REPORTEDLY IGNITED AND ALLOWED TO BURN IN PORTIONS OF THE LANDFILL. THE LANDFILL WAS CLOSED ON JANUARY 28, 1975 BY THE NASSAU COUNTY DEPARTMENT OF HEALTH ("NCDOH") BECAUSE OF A SUSPECTED GROUNDWATER POLLUTION PROBLEM.

SEVERAL LARGE COMPANIES HAVE BEEN IDENTIFIED AS GENERATORS OF LARGE QUANTITIES OF WASTES THAT WERE DISPOSED OF AT THE LANDFILL OVER A PERIOD OF YEARS. ACCORDING TO INFORMATION IN EPA'S POSSESSION, HOOKER CHEMICALS AND PLASTICS ("HOOKER") DISPOSED OF APPROXIMATELY 48 TONS OF HAZARDOUS WASTES AT THE LANDFILL FROM 1946 TO 1968. THE WASTES INCLUDED HEAVY METALS, SOLVENTS, ORGANICS, OILS AND SLUDGES, PLASTICIZERS, AND SMALL AMOUNTS OF POLYCHLORINATED BIPHENYLS ("PCBS"). HOOKER WAS ACQUIRED BY OCCIDENTAL CHEMICAL CORPORATION IN 1982. EPA'S RECORDS ALSO INDICATES THAT CERRO DISPOSED OF BETWEEN 700 AND 1080 TONS ANNUALLY OF INDUSTRIAL SLUDGES AT THE LANDFILL FROM 1950 TO 1975. THESE SLUDGES CONTAINED HIGH CONCENTRATIONS OF METALS, INCLUDING IRON, CHROMIUM, COPPER, ZINC, LEAD, CADMIUM, AND NICKEL. EPA RECORDS ALSO INDICATE THAT COLUMBIA CORRUGATED CONTAINER COMPANY DISPOSED OF APPROXIMATELY 108,000 GALLONS OF INDUSTRIAL SLUDGES SIMILAR IN COMPOSITION TO THOSE OF CERRO, ANNUALLY AT THE LANDFILL. IN ADDITION, GRUMMAN AEROSPACE CORPORATION HAS REPORTED THAT IT DISPOSED OF 4,889 TONS OF SLUDGE FROM ITS INDUSTRIAL WASTE TREATMENT PLANT AT THE LANDFILL FROM 1949 TO 1966. THIS SLUDGE CONSISTED PRIMARILY OF HYDROXIDES OF CHROMIUM, ALUMINUM, AND IRON. IT SHOULD BE NOTED THAT THE ABOVE-MENTIONED GENERATORS ARE ONLY SOME OF THE GENERATORS WHO ARE KNOWN TO HAVE DISPOSED OF HAZARDOUS SUBSTANCES AT THE LANDFILL. THE TOWN APPROACHED EPA IN 1986 AND EXPRESSED AN INTEREST IN PERFORMING THE RI/FS. SUBSEQUENTLY, EPA MAILED GENERAL NOTICE LETTERS TO NINE ADDITIONAL POTENTIALLY RESPONSIBLE PARTIES. ALL POTENTIALLY RESPONSIBLE PARTIES DECLINED TO PERFORM THE RI/FS.

IN JANUARY, 1983, ENVIRONMENTAL RESOURCES MANAGEMENT-NORTHEAST ("ERM") PREPARED A REPORT SUMMARIZING THE RESULTS OF A STUDY THAT IT PERFORMED FOR NCDOH. THE REPORT CONCLUDED THAT THE GROUNDWATER UNDERLYING AND NEAR THE SITE WAS BEING IMPACTED BY LANDFILL LEACHATE. HEAVY METALS CONCENTRATIONS OF ARSENIC, CADMIUM, CHROMIUM, AND LEAD WERE DETECTED AT LEVELS EXCEEDING NEW YORK STATE DRINKING WATER STANDARDS.

THE SITE WAS PLACED ON THE SUPERFUND NATIONAL PRIORITIES LIST ("NPL") IN SEPTEMBER 1983. AFTER A SERIES OF NEGOTIATING SESSIONS BETWEEN THE TOWN AND EPA, THE TOWN INDICATED A WILLINGNESS TO PERFORM THE REMEDIAL INVESTIGATION AND FEASIBILITY STUDY ("RI/FS") FOR THE SITE. ON JUNE 19, 1986, EPA AND THE TOWN ENTERED INTO AN ADMINISTRATIVE ORDER ON CONSENT, INDEX NO. II CERCLA-60203 (THE "ORDER"). THE ORDER REQUIRED THE TOWN TO CONDUCT AN RI/FS FOR THE SITE WITH PROVISIONS FOR PERFORMING INVESTIGATIONS OF CONTAMINANT MIGRATION AWAY FROM THE LANDFILL PROPERTY, AS DEEMED NECESSARY. SINCE THAT TIME, EPA HAS SEPARATED THE CLEANUP OF THE SITE INTO TWO PHASES OR OPERABLE UNITS. THE FIRST OPERABLE UNIT ADDRESSES THE IDENTIFICATION AND ABATEMENT OF THE SOURCE OF SITE CONTAMINATION AT THE LANDFILL PROPERTY. THE SECOND OPERABLE UNIT WILL ASSESS THE NATURE AND EXTENT AND NEED FOR ABATEMENT, IF ANY, OF MIGRATION OF CONTAMINANTS FROM THE LANDFILL PROPERTY INTO NEARBY GROUNDWATER AND WILL BE ADDRESSED AT A LATER DATE.

#HCP

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

THE RI/FS REPORTS AND THE PROPOSED PLAN FOR THE FIRST OPERABLE UNIT AT THE SITE WERE RELEASED TO THE PUBLIC IN JULY 1990. THESE DOCUMENTS WERE MADE AVAILABLE AT TWO INFORMATION REPOSITORIES MAINTAINED AT THE SYOSSET PUBLIC LIBRARY AND THE OYSTER BAY TOWN HALL. THE NOTICE OF AVAILABILITY FOR THESE DOCUMENTS WAS PUBLISHED IN NEWSDAY ON JULY 28, 1990. A PUBLIC COMMENT PERIOD WAS HELD FROM JULY 28, 1990 THROUGH AUGUST 28, 1990. IN ADDITION, A PUBLIC MEETING WAS HELD ON AUGUST 15, 1990 TO PRESENT THE RESULTS OF THE RI/FS AND THE PREFERRED ALTERNATIVE AS PRESENTED IN THE PROPOSED PLAN FOR THE LANDFILL. AT THIS MEETING, REPRESENTATIVES OF THE EPA PRESENTED THE PROPOSED PLAN REGARDING REMEDIATION OF THE SITE, AND LATER ANSWERED QUESTIONS AND RESPONDED TO COMMENTS CONCERNING SUCH PLAN AND OTHER DETAILS RELATED TO THE RI/FS REPORTS. RESPONSES TO THE COMMENTS AND QUESTIONS RECEIVED DURING THE PUBLIC COMMENT PERIOD, ARE INCLUDED IN THE RESPONSIVENESS SUMMARY, WHICH IS PART OF THIS ROD.

#SRRA

IV. SCOPE AND ROLE OF RESPONSE ACTION

AS WITH MANY SUPERFUND SITES, THE PROBLEMS AT THE SYOSSET LANDFILL SITE ARE COMPLEX. AS A RESULT, EPA AND NYSDEC HAVE DIVIDED THE WORK INTO TWO OPERABLE UNITS. THE OPERABLE UNITS ARE:

- ! OU 1: SOURCE CONTROL OF LANDFILL PROPERTY
- ! OU 2: STUDY OF MIGRATION OF CONTAMINANTS FROM THE LANDFILL PROPERTY INTO THE GROUNDWATER.

THIS ROD ADDRESSES THE FIRST OPERABLE UNIT AT THE LANDFILL. THE THREE PREDOMINANT CONTAMINANT TRANSPORT MEDIA TO BE ADDRESSED ARE SOIL, AIR AND GENERATION OF LEACHATE THAT MAY IMPACT THE GROUNDWATER. THE CONTAMINANT TRANSPORT THROUGH GROUNDWATER WILL BE ADDRESSED DURING THE SECOND OPERABLE UNIT ROD. SOURCE CONTROL MANAGEMENT OF THE LANDFILL WILL ADDRESS THE CLOSURE OF THE PORTION OF THE SITE WHICH WAS FORMERLY OPERATED AS THE SYOSSET LANDFILL PROPER.

THE RESULTS OF THE RI REVEALED THAT THE GROUNDWATER BENEATH AND DOWN-GRADIENT FROM THE LANDFILL HAS BEEN CONTAMINATED WITH LEACHATE. THE HIGHEST CONCENTRATIONS OF LEACHATE PARAMETERS (CHLORIDE, AMMONIA, ALKALINITY, HARDNESS, IRON) WERE FOUND IN DOWN-GRADIENT GROUNDWATER MONITORING WELLS. THESE RESULTS SUGGEST THE EXISTENCE OF A PLUME OF LEACHATE-CONTAMINATED GROUNDWATER EMANATING FROM THE LANDFILL. THE EXTENT OF THIS PLUME AS WELL AS THE NEED FOR MITIGATION WILL BE DELINEATED IN THE SECOND OPERABLE UNIT REMEDIAL INVESTIGATION. THE REMEDIATION OF THE SITE WILL BE COMPLETE ONLY AFTER EPA HAS SELECTED AND IMPLEMENTED REMEDIAL ACTIONS FOR BOTH OPERABLE UNITS.

#SSC

V. SUMMARY OF SITE CHARACTERISTICS

THE NATURE AND EXTENT OF CONTAMINATION AT THE LANDFILL WAS INVESTIGATED DURING THREE PHASES OF THE OU 1 RI. THESE THREE PHASES CONSISTED OF: LANDFILL GROUNDWATER STUDY, LANDFILL DIMENSION STUDY, AND SUB-SURFACE GAS STUDY.

GROUNDWATER

THE PURPOSE OF THE LANDFILL GROUNDWATER STUDY WAS TO CHARACTERIZE THE PREVIOUSLY REPORTED IMPACTS TO GROUNDWATER QUALITY FROM THE LANDFILL. THE SCOPE OF WORK FOR THIS STUDY INCLUDED DRILLING AND INSTALLING SEVEN MONITORING WELLS, COLLECTING GROUNDWATER AND SOIL SAMPLES FOR LABORATORY ANALYSES, AND MONITORING WATER LEVELS IN THE MONITORING WELLS ON THE LANDFILL PROPERTY.

TWO ROUNDS OF GROUNDWATER SAMPLING WERE CONDUCTED AT THE LANDFILL. FILTERED AND UNFILTERED SAMPLES WERE COLLECTED FOR METALS. THE ANALYTICAL RESULTS FOR VOLATILE ORGANIC COMPOUNDS ("VOCS") DETECTED ARE SUMMARIZED IN TABLE 1. THE CONCENTRATIONS AND DISTRIBUTION OF VOCS DETECTED DID NOT SUGGEST A PLUME OR BODY OF VOC-IMPACTED WATER ATTRIBUTABLE TO THE LANDFILL.

A NUMBER OF METALS WERE ALSO DETECTED IN GROUNDWATER SAMPLES. TABLE 2 PROVIDES A SUMMARY OF THE METALS ANALYTICAL RESULTS. BOTH FILTERED AND UNFILTERED SAMPLES WERE COLLECTED FOR METAL ANALYSES DURING THE FIRST ROUND OF SAMPLING AND ONLY FILTERED SAMPLES WERE COLLECTED FOR THE SECOND ROUND. SOME OF THE UNFILTERED

SAMPLES, EXCEEDED THE PRIMARY DRINKING WATER STANDARDS FOR ARSENIC AND LEAD, AND ZINC EXCEEDED THE SECONDARY DRINKING WATER STANDARDS PROMULGATED PURSUANT TO THE SAFE WATER DRINKING ACT 42 USC 300F-300J.

IN ADDITION TO THE ORGANIC AND METAL CONTAMINANTS DETECTED IN GROUNDWATER SAMPLES, A NUMBER OF INORGANIC COMPOUNDS WERE DETECTED ABOVE BACKGROUND LEVELS. THE GROUP OF COMPOUNDS INCLUDE NATURALLY-OCCURRING ANIONS AND CATIONS, SOME OF WHICH ARE EXTREMELY USEFUL IN DETERMINING LANDFILL LEACHATE IMPACTS TO GROUNDWATER. AMMONIA, HARDNESS, ALKALINITY, IRON, SODIUM, POTASSIUM, DISSOLVED SOLIDS, AND CHLORIDE HAVE BEEN EMPLOYED AS INDICATOR PARAMETERS FOR LANDFILL LEACHATE. THE ANALYTICAL RESULTS FOR THESE PARAMETERS ARE PRESENTED IN TABLE 3. THE DISTRIBUTION OF LEACHATE INDICATOR PARAMETERS CLEARLY INDICATES THAT GROUNDWATER IS BEING IMPACTED BY LANDFILL LEACHATE, AS EVIDENCED BY ELEVATED CONCENTRATIONS OF DISSOLVED SOLIDS, CHLORIDE, AMMONIA, ALKALINITY, AND HARDNESS. THE RELATIVELY HIGHER CONCENTRATIONS OF LEACHATE INDICATOR PARAMETERS DETECTED IN BOTH SHALLOW AND DEEP DOWN-GRADIENT GROUNDWATER MONITORING WELLS SUGGEST THE EXISTENCE OF A PLUME OF LEACHATE-IMPACTED GROUNDWATER EMANATING FROM THE LANDFILL IN THE DIRECTION OF GROUNDWATER FLOW. HOWEVER, THIS WILL BE FURTHER INVESTIGATED DURING THE SECOND OPERABLE UNIT RI/FS.

LANDFILL DIMENSION STUDY

THE PRINCIPLE OBJECTIVE OF THE LANDFILL DIMENSION STUDY WAS TO CHARACTERIZE THE WASTE IN THE LANDFILL. A TOTAL OF FOUR SOIL BORINGS (B-1, B-2, B-3, B-4) WERE DRILLED IN THE LANDFILL AREA AT THE LOCATIONS SHOWN IN FIGURE 2. THE LOCATIONS WERE SELECTED BASED ON THE RESULT OF HISTORICAL INFORMATION. BORINGS B-1 AND B-2 WERE DRILLED THROUGH THE LANDFILL MATERIAL TO PENETRATE TEN FEET INTO NATIVE SOIL, AND BORINGS B-3 AND B-4 WERE DRILLED TO BELOW THE WATER TABLE (100 - 115 FT BELOW LAND SURFACE) SO THAT MONITORING WELLS COULD BE INSTALLED.

SAMPLES OF LANDFILL MATERIALS AND NATIVE SOIL WERE COLLECTED AT FIVE FOOT INTERVALS. THREE SAMPLES OF THE LANDFILL MATERIAL WERE COLLECTED FOR LABORATORY ANALYSIS FROM EACH OF THE FOUR SOIL BORINGS TO CHEMICALLY CHARACTERIZE THE FILL MATERIAL; THESE SAMPLES WERE SELECTED FROM THE SET OF SAMPLES COLLECTED AT FIVE FOOT INTERVALS. TWO SHALLOW MONITORING WELLS WERE INSTALLED IN TWO OF THE FOUR SOIL BORINGS (B-3 AND B-4) AND NUMBERED AS W-3 AND W-4, RESPECTIVELY.

THE RESULTS OF THE VOC ANALYSES FOR THE SOIL SAMPLES COLLECTED FROM THE SOIL BORINGS ARE PRESENTED IN TABLE 4. VOCs WERE DETECTED IN TOTAL CONCENTRATIONS RANGING FROM 19 PPB IN B-1 (55 FEET BELOW LAND SURFACE) TO 180 PPB IN B-3 (40 FEET BELOW LAND SURFACE). VOCs WERE NOT DETECTED IN SAMPLES COLLECTED FROM B-2 (85 FEET BELOW LAND SURFACE), B-3 (80 FEET BELOW LAND SURFACE AND 110 FEET BELOW LAND SURFACE), AND B-4 (70 FEET BELOW LAND SURFACE, 100 FEET BELOW LAND SURFACE). IN EACH OF THESE INSTANCES, EXCEPT FOR THE 80 FOOT SAMPLE FROM B-3, THE SAMPLES WERE COLLECTED FROM THE BOTTOM OF THE LANDFILL. SEVERAL VOC COMPOUNDS WERE DETECTED IN APPROXIMATELY THE SAME CONCENTRATION RANGE (APPROXIMATELY 0-40 PPB), THE SUMMATION OF WHICH YIELD THE TOTAL VOC VALUES. THE EXCEPTION IS THE DETECTION OF CHLOROBENZENE IN B-3 IN A CONCENTRATION OF 180 PPB, WHICH IS THE HIGHEST SINGLE CONCENTRATION FOR AN INDIVIDUAL VOC AND ALSO THE HIGHEST TOTAL CONCENTRATION.

THE RESULTS FOR SOIL SAMPLES COLLECTED FROM THE WELL BORINGS DRILLED DURING THE LANDFILL GROUNDWATER STUDY ARE PRESENTED IN TABLE 5. ONLY TWO SOIL SAMPLES COLLECTED FROM THE WELL BORINGS DURING THIS STUDY DETECTED VOCs. TOTAL VOCs WERE DETECTED IN CONCENTRATION RANGING FROM 5PPB - 335 PPB.

PCBS WERE DETECTED IN TOTAL CONCENTRATIONS OF 730 PPB AND 380 PPB IN BORING B-1 (15 AND 40 FEET BELOW LAND SURFACE, RESPECTIVELY) AND 4,600 PPB, 560 PPB, AND 171 PPB IN BORING B-4 (40, 70, AND 100 FOOT BELOW LAND SURFACE, RESPECTIVELY).

SUB-SURFACE GAS STUDY

THE SUB-SURFACE GAS STUDY WAS DESIGNED AND IMPLEMENTED TO DETERMINE THE NATURE AND EXTENT OF LANDFILL GASES. A TOTAL OF 19 GAS MONITORING WELLS WERE INSTALLED AT THE LOCATIONS SHOWN IN FIGURE 3. FIVE OF THE 19 GAS WELLS(G-2, G-10, G-17, G-18, AND G-19) PENETRATED THE CLEAN LANDFILL COVER INTO LANDFILL MATERIAL. THE REMAINING 14 GAS WELLS WERE POSITIONED VERY CLOSE TO THE LANDFILL BOUNDARIES. THE GAS WELLS WERE SAMPLED ON A MONTHLY BASIS WITH AN ORGANIC VAPOR ANALYZER ("OVA") FOR THE PRESENCE OF METHANE AND TOTAL VOLATILE ORGANIC VAPORS. IN ADDITION, TWO ROUNDS OF GAS SAMPLES WERE COLLECTED FOR LABORATORY ANALYSES.

THE RESULTS OF THE MONTHLY WELL MONITORING PROGRAMS ARE SUMMARIZED IN TABLE 6. AS SHOWN IN TABLE 6, IN TEN OF THE WELLS, LANDFILL GASES WERE NOT DETECTED FOR THE MAJORITY OF THE MONITORING PERIOD. WHEN GASES WERE DETECTED, THEY WERE FOUND IN THE LOW PARTS PER MILLION RANGE. IN THE REMAINING NINE WELLS, LOCATED ALONG THE MIDDLE AND THE SOUTHWESTERN CORNER OF THE LANDFILL, HIGH CONCENTRATIONS OF LANDFILL GASES WERE DETECTED FREQUENTLY IN CONCENTRATIONS EXCEEDING THE UPPER QUANTIFICATION LIMIT (1,000 PPM TO 100,000 PPM DEPENDING ON THE OVA MODEL USED) OF THE OVA.

A PASSIVE GAS VENTILATION SYSTEM CONSISTING OF A TRENCH AND A SERIES OF VERTICAL VENTING PIPES WITHIN THE TRENCH, PARALLELS THE FENCE SEPARATING THE LANDFILL FROM THE SCHOOL. THIS SYSTEM HAS BEEN MONITORED FOR THE PRESENCE OF METHANE GAS SINCE 1981. SINCE THAT TIME, METHANE HAS OCCASIONALLY BEEN DETECTED IN THE VENT PIPES. HOWEVER, METHANE HAS REPORTEDLY NEVER BEEN DETECTED IN TWO PERMANENT GAS MONITORING POINTS ON THE SCHOOL'S PROPERTY.

THE TWO ROUNDS OF LANDFILL GASES SAMPLED WERE COLLECTED FROM THE TEN GAS MONITORING WELLS WHICH CONSISTENTLY EXHIBITED THE HIGHEST CONCENTRATIONS OF METHANE AND NON-METHANE COMPOUNDS MEASURED WITH THE OVA. THE ANALYTICAL RESULTS FOR BOTH SAMPLING ROUNDS ARE PRESENTED IN TABLE 7.

AS SHOWN IN TABLE 7, TOTAL VOCS WERE DETECTED IN CONCENTRATIONS RANGING FROM 45 PPB TO GREATER THAN 1,335 PPB AND FROM 40 PPB TO 432 PPB FOR ROUNDS ONE AND TWO, RESPECTIVELY. INDIVIDUAL VOCS THAT WERE DETECTED IN HIGHEST CONCENTRATIONS INCLUDED VINYL CHLORIDE, CHLOROETHANE, METHYLENE CHLORIDE, TETRACHLOROETHYLENE, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENE. VINYL CHLORIDE WAS DETECTED IN CONCENTRATIONS EXCEEDING THE UPPER QUANTIFICATION LIMIT (400 PPB) IN WELLS G-2, G-7, AND G-17. CHLOROETHANE WAS ALSO DETECTED IN A CONCENTRATION EXCEEDING THE UPPER QUANTIFICATION LIMIT IN WELL G-2. THE UPPER LIMITS WERE EXCEEDED FOR BOTH COMPOUNDS BECAUSE THE TRAP USED TO COLLECT THE SAMPLES BECAME SATURATED WITH THE COMPOUNDS BEFORE THE FIXED VOLUME OF SAMPLE (250 ML) WAS FULLY COLLECTED. THEREFORE, TO PERMIT QUANTIFICATION OF THESE COMPOUNDS, A SECOND ROUND OF SAMPLES WAS COLLECTED USING A SMALLER SAMPLE VOLUME (100 ML).

ALTHOUGH VINYL CHLORIDE AND CHLOROETHANE WERE DETECTED ABOVE THE UPPER QUANTIFICATION LIMIT IN ROUND ONE OF SAMPLING, THESE COMPOUNDS WERE NOT DETECTED IN ANY OF THE WELLS SAMPLED DURING THE SECOND ROUND.

#SSR

VI. SUMMARY OF SITE RISKS

EPA CONDUCTED AN ENDANGERMENT ASSESSMENT ("EA"), OR RISK ASSESSMENT OF THE "NO-ACTION" ALTERNATIVE TO EVALUATE THE POTENTIAL RISKS TO HUMAN HEALTH AND THE ENVIRONMENT ASSOCIATED WITH THE LANDFILL IN ITS CURRENT STATE. THE EA FOCUSED ON THE LANDFILL CONTAMINANTS WHICH ARE LIKELY TO POSE THE MOST SIGNIFICANT RISKS TO HUMAN HEALTH AND THE ENVIRONMENT ("INDICATOR CHEMICALS"). THESE INDICATOR CHEMICALS AND THEIR CONCENTRATIONS IN SITE MEDIA ARE SHOWN IN TABLE 8.

EXPOSURE ASSESSMENT

EPA'S EA IDENTIFIED SEVERAL POTENTIAL EXPOSURE PATHWAYS BY WHICH THE PUBLIC MAY BE EXPOSED TO CONTAMINANT RELEASES FROM THE LANDFILL. THESE PATHWAYS AND THE POPULATIONS POTENTIALLY AFFECTED ARE SHOWN IN TABLE 9. THE THREE POTENTIAL EXPOSURE ROUTES IDENTIFIED IN THE EA INCLUDE: 1) EXPOSURES TO ORGANIC COMPOUNDS AND METALS FROM INGESTION OF OR CONTACT WITH CONTAMINATED GROUNDWATER IN THE VICINITY OF THE SITE; 2) INHALATION EXPOSURES TO VOLATILE ORGANIC COMPOUNDS EMITTED FROM CONTAMINATED SOILS; AND 3) INHALATION EXPOSURES TO VOLATILE ORGANIC COMPOUNDS RELEASED FROM CONTAMINATED GROUNDWATER DURING SHOWERING. THE POTENTIALLY EXPOSED POPULATIONS INCLUDE WORKERS AT THE TOWN OF OYSTER BAY DEPARTMENT OF PUBLIC WORKS, LOCATED ON THE SOUTHERN MARGIN OF THE LANDFILL; CHILDREN, FACULTY, AND STAFF AT THE SCHOOL; AND RESIDENTS OF THE SURROUNDING NEIGHBORHOODS.

TOXICITY ASSESSMENT

THE EA ASSESSED THE RISKS ASSOCIATED WITH EXPOSURES TO CARCINOGENIC (CANCER CAUSING) AND NONCARCINOGENIC INDICATOR CHEMICALS.

NONCARCINOGENIC RISKS WERE ASSESSED USING A HAZARD INDEX ("HI") APPROACH, BASED ON A COMPARISON OF EXPECTED

CONTAMINANT INTAKES AND SAFE LEVELS OF INTAKE (REFERENCE DOSES). REFERENCE DOSES ("RFDs") HAVE BEEN DEVELOPED BY EPA FOR INDICATING THE POTENTIAL FOR ADVERSE HEALTH EFFECTS. RFDs, WHICH ARE EXPRESSED IN UNITS OF MG/KG-DAY, ARE ESTIMATES OF DAILY EXPOSURE LEVELS FOR HUMANS WHICH ARE THOUGHT TO BE SAFE OVER A LIFETIME (INCLUDING SENSITIVE INDIVIDUALS). ESTIMATED INTAKES OF CHEMICALS FROM ENVIRONMENTAL MEDIA (E.G., THE AMOUNT OF A CHEMICAL INGESTED FROM CONTAMINATED DRINKING WATER) ARE COMPARED WITH THE RFD TO DERIVE THE HAZARD QUOTIENT FOR THE CONTAMINANT IN THE PARTICULAR MEDIA. THE HI IS OBTAINED BY ADDING THE HAZARD QUOTIENTS FOR ALL COMPOUNDS ACROSS ALL MEDIA. A HI GREATER THAN 1 INDICATES THAT POTENTIAL EXISTS FOR NON-CARCINOGENIC HEALTH EFFECTS TO OCCUR AS A RESULT OF SITE-RELATED EXPOSURES. THE HI PROVIDES A USEFUL REFERENCE POINT FOR GAUGING THE POTENTIAL SIGNIFICANCE OF MULTIPLE CONTAMINANT EXPOSURES WITHIN A SINGLE MEDIUM OR ACROSS MEDIA. THE RFDs AND HIS FOR THE INDICATOR CHEMICALS AT THE LANDFILL ARE PRESENTED IN TABLES 10 A-D.

THE HI FOR NON-CARCINOGENIC EFFECTS FROM THE LANDFILL IS LESS THAN ONE FOR ADULTS AND FOR CHRONIC EXPOSURES TO CONTAMINATED GROUNDWATER FOR CHILDREN. HOWEVER, THE SUBCHRONIC HI FOR CHILDREN IS GREATER THAN ONE (2.61) DUE TO INGESTION OF GROUNDWATER CONTAMINATED WITH ARSENIC. THIS VALUE COMES MOSTLY FROM INGESTION OF ARSENIC, AND IS ABOVE THE EPA GUIDANCE LEVEL OF ONE.

POTENTIAL CARCINOGENIC RISKS WERE EVALUATED USING THE CANCER POTENCY FACTORS DEVELOPED BY THE EPA FOR THE INDICATOR COMPOUNDS. CANCER POTENCY FACTORS ("CPFS") HAVE BEEN DEVELOPED BY EPA'S CARCINOGEN RISK ASSESSMENT VERIFICATION ENDEAVOR FOR ESTIMATING EXCESS LIFETIME CANCER RISKS ASSOCIATED WITH EXPOSURE TO POTENTIALLY CARCINOGENIC CHEMICALS. CPFS, WHICH ARE EXPRESSED IN UNITS OF (MG/KG-DAY)⁻¹, ARE MULTIPLIED BY THE ESTIMATED INTAKE OF A POTENTIAL CARCINOGEN, IN MG/KG-DAY, TO GENERATE AN UPPER-BOUND ESTIMATE OF THE EXCESS LIFETIME CANCER RISK ASSOCIATED WITH EXPOSURE TO THE COMPOUND AT THAT INTAKE LEVEL. THE TERM "UPPER BOUND" REFLECTS THE CONSERVATIVE ESTIMATE OF THE RISKS CALCULATED FROM THE CPF. USE OF THIS APPROACH MAKES THE UNDERESTIMATION OF THE RISK HIGHLY UNLIKELY. THE CPFS FOR THE INDICATOR CHEMICALS AND THEIR CORRESPONDING CANCER RISK LEVELS ARE PRESENTED IN TABLES 11A AND 11B.

HUMAN HEALTH RISK CHARACTERIZATION

FOR KNOWN OR SUSPECTED CARCINOGENS, THE USEPA CONSIDERS EXCESS UPPER BOUND INDIVIDUAL LIFETIME CANCER RISKS OF BETWEEN $1 \times (10^{-4})$ TO $1 \times (10^{-6})$ TO BE ACCEPTABLE WITH (10^{-6}) BEING THE POINT OF DEPARTURE. THIS LEVEL INDICATES THAT AN INDIVIDUAL HAS NOT GREATER THAN A ONE IN TEN THOUSAND TO ONE IN A MILLION CHANCE OF DEVELOPING CANCER AS A RESULT OF SITE-RELATED EXPOSURE TO A CARCINOGEN OVER A 70-YEAR PERIOD UNDER SPECIFIC EXPOSURE CONDITIONS AT THE SITE. THE CUMULATIVE UPPER BOUND RISK FOR ADULTS FOR ALL CARCINOGENS AT THE LANDFILL IS $4.0 \times (10^{-5})$. THE CUMULATIVE UPPER BOUND RISK FOR CHILDREN FOR ALL CARCINOGENS AT THE LANDFILL IS $3.0 \times (10^{-5})$. HENCE, THE RISKS FOR CARCINOGENS AT THE LANDFILL FALL WITHIN THE ACCEPTABLE EPA RISK RANGE OF (10^{-4}) TO (10^{-6}) . HOWEVER, EPA'S PREFERENCE IS TO SELECT REMEDIES THAT ARE AT THE MORE PROTECTIVE END OF THE RISK RANGE. THEREFORE, EPA HAS DETERMINED THAT THE TARGET RISK FOR THE LANDFILL SHOULD BE ON THE ORDER OF $1 \times (10^{-6})$, GIVEN THE SIZE AND PROXIMITY OF POTENTIALLY EXPOSED NEIGHBORING POPULATIONS TO THE LANDFILL AND THE LIKELIHOOD OF EXPOSURES. THEREFORE, LANDFILL REMEDIATION WILL BE PERFORMED.

UNCERTAINTIES

THE PROCEDURES AND INPUTS USED TO ASSESS RISKS IN THIS EVALUATION, AS IN ALL SUCH ASSESSMENTS, ARE SUBJECT TO A WIDE VARIETY OF UNCERTAINTIES. IN GENERAL, THE MAIN SOURCES OF UNCERTAINTY INCLUDE:

- ! ENVIRONMENTAL CHEMISTRY SAMPLING AND ANALYSIS
- ! ENVIRONMENTAL PARAMETER MEASUREMENT
- ! FATE AND TRANSPORT MODELING
- ! EXPOSURE PARAMETER ESTIMATION
- ! TOXICOLOGICAL DATA

UNCERTAINTY IN ENVIRONMENTAL SAMPLING ARISES IN PART FROM THE POTENTIALLY UNEVEN DISTRIBUTION OF CHEMICALS IN THE MEDIA SAMPLED. CONSEQUENTLY, THERE IS SIGNIFICANT UNCERTAINTY AS TO THE ACTUAL LEVELS PRESENT. ENVIRONMENTAL CHEMISTRY ANALYSIS UNCERTAINTY CAN STEM FROM SEVERAL SOURCES INCLUDING THE ERRORS INHERENT IN THE ANALYTICAL METHODS AND CHARACTERISTICS OF THE MATRIX BEING SAMPLED. UNCERTAINTIES IN THE EXPOSURE ASSESSMENT ARE RELATED TO ESTIMATES OF HOW OFTEN AN INDIVIDUAL WOULD ACTUALLY COME IN CONTACT WITH THE CHEMICALS OF CONCERN, THE PERIOD OF TIME OVER WHICH SUCH EXPOSURE WOULD OCCUR, AND IN THE MODELS USED TO

ESTIMATE THE CONCENTRATIONS OF THE CHEMICALS OF CONCERN AT THE POINT OF EXPOSURE. IN THE EA FOR THE SYOSSET LANDFILL SITE, CONTACT WITH ARSENIC-CONTAMINATED GROUNDWATER WAS ASSUMED TO OCCUR FROM A PUBLIC WATER SUPPLY WELL LOCATED APPROXIMATELY 1000 FEET FROM THE LANDFILL (N-4133). ALTHOUGH, THIS WELL WAS ABANDONED AND SEALED IN 1982, SO THAT IT CAN NO LONGER BE USED, THE ASSUMPTION WAS MADE TO UTILIZE THIS WELL IN THE EA TO DETERMINE THE EFFECT THAT A FUTURE WELL MIGHT HAVE IF IT WERE LOCATED AT A SIMILAR DISTANCE DOWN GRADIENT OF THE LANDFILL. THIS IS A CONSERVATIVE ASSUMPTION SINCE THE NYSDEC STRICTLY REGULATES THE PLACEMENT OF GROUNDWATER SUPPLY WELLS ON LONG ISLAND. UNCERTAINTIES IN TOXICOLOGICAL DATA OCCUR IN EXTRAPOLATING BOTH FROM ANIMALS TO HUMANS AND FROM HIGH TO LOW DOSES OF EXPOSURE, AS WELL AS FROM THE DIFFICULTIES IN ASSESSING THE TOXICITY OF A MIXTURE OF CHEMICALS. THESE UNCERTAINTIES ARE ADDRESSED BY MAKING CONSERVATIVE ASSUMPTIONS CONCERNING RISK AND EXPOSURE PARAMETERS THROUGHOUT THE ASSESSMENT. AS A RESULT, THE EA PROVIDES UPPER BOUND ESTIMATES OF THE RISKS TO POPULATIONS NEAR THE LANDFILL, AND IS HIGHLY UNLIKELY TO UNDERESTIMATE ACTUAL RISKS RELATED TO THE LANDFILL.

RISK SUMMARY

ACTUAL OR THREATENED RELEASES OF HAZARDOUS SUBSTANCES FROM THE LANDFILL, IF NOT ADDRESSED BY IMPLEMENTING THE RESPONSE ACTION SELECTED IN THIS ROD, MAY PRESENT AN IMMINENT AND SUBSTANTIAL ENDANGERMENT TO PUBLIC HEALTH, WELFARE, OR THE ENVIRONMENT.

#DRA

VII. DESCRIPTION OF REMEDIAL ALTERNATIVES

THE GOAL OF THE RA IS TO PREVENT, REDUCE, OR CONTROL THE CONTAMINANTS THAT MAY BE LEAVING THE LANDFILL AND ENTERING THE GROUNDWATER AND AIR. TECHNICALLY APPLICABLE TECHNOLOGIES WERE IDENTIFIED IN THE FS REPORT. IN GENERAL, TREATMENT OR REMOVAL ALTERNATIVES THAT REDUCE TOXICITY, MOBILITY, OR VOLUME ARE PREFERRED. HOWEVER, IT HAS BEEN ESTIMATED THAT A TOTAL OF THREE MILLION CUBIC YARDS OF WASTE WERE LANDFILLED AT THE 35-ACRE LANDFILL. THESE WASTES WERE PLACED AT DEPTHS TO 90 FEET BELOW GROUND SURFACE. IF THE WASTE IS REMOVED, CLEAN FILL MATERIAL WOULD HAVE TO BE BROUGHT IN TO BRING THE LANDFILL TO EXISTING GROUND SURFACE ELEVATIONS. THE COST FOR REMOVAL, DISPOSAL, AND FILLING OPERATIONS FOR THIS LANDFILL WOULD BE APPROXIMATELY 775 MILLION DOLLARS. THE TOTAL COST FOR REMOVAL, TREATMENT, AND FILLING OPERATIONS WOULD BE IN THE ORDER OF ONE BILLION DOLLARS. PARTIAL ("HOT SPOT") REMOVAL OR TREATMENT WOULD BE A MORE FEASIBLE OPTION. HOWEVER, IT IS NOT APPROPRIATE AT THE LANDFILL, BECAUSE NO DISCRETE AREAS, CONTAMINATED BY HIGH LEVELS OF AN IDENTIFIABLE WASTE TYPE WHICH REPRESENTED A PRINCIPAL THREAT TO PUBLIC HEALTH OR THE ENVIRONMENT, WERE LOCATED. RESULTS FROM THE OU 1 RI OBSERVED LOW CONCENTRATION CONTAMINANTS DISPERSED THROUGHOUT THE LANDFILL. REMOVAL AND DISPOSAL TECHNOLOGIES WERE ELIMINATED IN THE SCREENING PROCESS DUE TO EXCESSIVE COST AND IMPRACTICABILITY.

THE FIRST OPERABLE UNIT FS FOCUSED ON THE NO-ACTION ALTERNATIVE AND THREE LANDFILL CLOSURE ALTERNATIVES FOR DETAILED EVALUATION. THE LANDFILL CLOSURE ALTERNATIVES CONSISTED OF THREE CONTAINMENT OPTIONS. ESTIMATED COSTS AND IMPLEMENTATION TIMES ARE SUMMARIZED HERE FROM THE FS. IT SHOULD BE NOTED THAT THE IMPLEMENTATION PERIODS INCLUDE A COMPONENT FOR THE DESIGN OF THE INTENDED REMEDIAL ACTION.

ALTERNATIVE 1: NO ACTION

THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 (CERCLA) REQUIRES THAT THE "NO-ACTION" ALTERNATIVE BE CONSIDERED AT EVERY SITE. UNDER THIS ALTERNATIVE, THE LANDFILL WOULD BE RETAINED IN ITS CURRENT CONDITION. NO REMEDIATION MEASURES WOULD BE IMPLEMENTED. HOWEVER, LONG-TERM MONITORING OF THE GROUNDWATER AND SUBSURFACE GAS AT THE LANDFILL WOULD BE NECESSARY TO MONITOR CONTAMINANT MIGRATION. MONITORING CAN BE IMPLEMENTED BY USING PREVIOUSLY-INSTALLED GAS AND GROUNDWATER MONITORING WELLS. COSTS INCURRED FOR THIS ALTERNATIVE WOULD BE LIMITED TO LANDFILL MAINTENANCE AND MONITORING COSTS.

NO CAPITAL COST WOULD BE REQUIRED TO IMPLEMENT THIS ALTERNATIVE. THE PRESENT WORTH VALUE FOR THE ESTIMATED ANNUAL MAINTENANCE AND MONITORING COST OF THE NO-ACTION ALTERNATIVE IS APPROXIMATELY ONE MILLION DOLLARS PER YEAR. THERE WOULD BE NO CHANGE IN THE LEVEL OF PROTECTION OF PUBLIC HEALTH.

SOURCE CONTROL MEASURES:

CONTAINMENT OF POTENTIALLY CONTAMINATED SOIL AND WASTE AT THE LANDFILL INVOLVES THE PLACEMENT OF AN

IMPERMEABLE COVER OVER THE EXISTING FILL MATERIAL. CONTAINMENT TECHNOLOGIES ARE ADVANTAGEOUS SINCE THEY ALLOW THE WASTE MATERIALS TO REMAIN IN PLACE WHILE THE COVER SYSTEM MINIMIZES FUTURE EXPOSURE PATHWAYS. CAPPING SYSTEMS HAVE BEEN USED FOR MANY YEARS DURING LANDFILL CLOSURE OPERATIONS AND HAVE PROVEN TO BE AN EFFECTIVE AND RELIABLE MEANS OF PROTECTING HUMAN HEALTH AND THE ENVIRONMENT. THE CAP SYSTEM WOULD BE DESIGNED AND CONSTRUCTED TO MINIMIZE EROSION OF THE COVER, AND PROVIDE LONG-TERM MINIMIZATION OF MIGRATION OF LIQUIDS THROUGH THE UNDERLYING CONTAMINATED SOILS.

ALL OF THE CAPPING SYSTEMS THAT WERE EVALUATED CONSIST OF A BOTTOM LAYER OF PERMEABLE GAS VENTING MATERIAL, OVERLAIN BY A LOW PERMEABILITY BARRIER LAYER COVERED BY A BARRIER PROTECTION LAYER.

THE PERMEABLE GAS VENTING LAYER MUST HAVE PROVISIONS FOR A GAS VENTING AND COLLECTION SYSTEM TO RELEASE ANY LANDFILL GASES TRAPPED UNDER THE CAP TO PREVENT GAS MIGRATION AND CAP DEGRADATION. THE GAS CONTROL SYSTEM MUST BE DESIGNED TO PREVENT GAS MIGRATION AWAY FROM THE LANDFILL; PREVENT THE ACCUMULATION OF GAS IN CONCENTRATIONS GREATER THAN 25 PERCENT OF THE LOWER EXPLOSIVE LIMIT FOR GASES IN STRUCTURES ON OR OFF THE LANDFILL PROPERTY; AND CONTROL OBJECTIONABLE ODORS FROM GAS EMISSION.

THE REQUIRED LOW PERMEABILITY BARRIER MAY CONSIST EITHER OF A LAYER OF LOW PERMEABILITY SOIL OR A GEOSYNTHETIC MEMBRANE.

THE BARRIER PROTECTION LAYER WOULD CONSIST OF BITUMINOUS ASPHALT CONCRETE LAYER WHERE FUTURE LAND USE BY THE TOWN OF OYSTER BAY DEPARTMENT OF PUBLIC WORKS IS ANTICIPATED. ANTICIPATED USES FOR THE LANDFILL INCLUDE UTILIZING A PORTION OF THE LANDFILL FOR HIGHWAY YARD OPERATIONS, MATERIALS STORAGE, COMPOSING, VEHICLE PARKING OR CONSTRUCTION OF A RECYCLING FACILITY. ANY AREAS ON THE LANDFILL PROPERTY WHOSE ANTICIPATED USE DOES NOT REQUIRE AN ASPHALT SURFACE WILL UTILIZE THE STANDARD VEGETATIVE COVER MATERIAL SPECIFIED IN NYCRR PART 360.

DISADVANTAGES OF CAPPING INCLUDE THE CONCERN OF WASTE MATERIAL REMAINING IN PLACE, THE POTENTIAL FOR THE CAP TO LEAK AND GENERATE ADDITIONAL LEACHATE UNLESS PROPERLY MAINTAINED, AND THE MAGNITUDE OF GRADING REQUIRED TO MINIMIZE STANDING WATER BECAUSE THE LANDFILL IS RELATIVELY FLAT. LEAKAGE OF THE CAP IS A POTENTIAL CONCERN BECAUSE OF THE POTENTIAL FOR FUTURE LEACHATE GENERATION. TO REDUCE THE RISK OF LEAKS DEVELOPING IN THE SYSTEM OVER TIME, WHICH WOULD HAVE AN IMPACT ON THE GROUNDWATER, LONG-TERM OPERATION AND MAINTENANCE (O&M) WOULD BE REQUIRED.

ALTERNATIVE 2A: NEW YORK STATE PART 360 REGULATIONS-LOW PERMEABILITY SOIL CAP

CAPITAL COST:	\$30.3 MILLION
ANNUAL OPERATION AND MAINTENANCE:	\$280,000
ESTIMATED PRESENT WORTH:	\$32.9 MILLION
TIME TO IMPLEMENT THE REMEDIAL ACTION:	36 MONTHS

ALTERNATIVE 2A CONSISTS OF A LOW PERMEABILITY SOIL CAP (CLAY) FOR LANDFILL CLOSURE WHICH COMPLIES WITH 6 NYCRR PART 360. THE MINIMUM CAP SECTION UTILIZING ASPHALT FOR THE BARRIER PROTECTION LAYER, WHERE FUTURE LAND USE FOR THE TOWN'S DEPARTMENT OF PUBLIC WORKS IS ANTICIPATED, IS SHOWN IN FIGURE 4. THE MINIMUM CAP SECTION UTILIZING VEGETATIVE COVER, WHERE FUTURE LAND USE IS NOT ANTICIPATED IS SHOWN IN FIGURE 5, AND CONSISTS OF THE FOLLOWING LAYERS:

- * 24 INCHES BARRIER PROTECTION LAYER
- * 3 INCHES ASPHALT TOP COURSE OR SOIL * 6 INCHES VEGETATED TOP
- * 8 INCHES ASPHALT BASE COURSE OR OTHER * 18 INCHES SILTY SAND OR SUITABLE SOIL COVER
- * 13 INCHES SUBBASE COURSE
- * 18 INCHES OF LOW PERMEABILITY SOIL LAYER (PERMEABILITY 1×10^{-7} CM/SEC)

- * 2 LAYERS OF GEOSYNTHETIC FILTER FABRIC
- * 12 INCHES OF GAS VENTING LAYER (PERMEABILITY 1×10^{-3} CM/SEC)
- * CLEAN SOIL FILL OF VARYING THICKNESS TO CONSTRUCT A CAP SYSTEM FOUNDATION WITH A MINIMUM 4.0 PERCENT SLOPE
- * GAS RISER VENTS EXTENDING FROM WITHIN THE REFUSE MATERIAL TO 3 FEET ABOVE THE FINAL GROUND SURFACE ELEVATION (MINIMUM OF ONE GAS RISER VENT PER ACRE); AND
- * CRUSHED STONE BACKFILL AROUND GAS VENTING RISERS.

ALTERNATIVE 2B: NEW YORK STATE PART 360 REGULATIONS - GEOSYNTHETIC MEMBRANE CAP

CAPITAL COST: \$24.1 MILLION
 ANNUAL OPERATION AND MAINTENANCE: \$222,000
 ESTIMATED PRESENT WORTH: \$26.2 MILLION
 TIME TO IMPLEMENT THE REMEDIAL ACTION: 30 MONTHS

ALTERNATIVE 2B CONSISTS OF A GEOSYNTHETIC MEMBRANE CAP FOR LANDFILL CLOSURE WHICH COMPLIES WITH 6 NYCRR PART 360. THE MINIMUM CAP SECTION UTILIZING ASPHALT FOR THE BARRIER PROTECTION LAYER, WHERE FUTURE LAND USE FOR THE TOWN'S DEPARTMENT OF PUBLIC WORKS IS ANTICIPATED, IS SHOWN IN FIGURE 4. THE MINIMUM CAP SECTION UTILIZING A VEGETATIVE COVER, WHERE FUTURE LAND USE IS NOT ANTICIPATED, IS SHOWN IN FIGURE 5, AND CONSISTS OF THE FOLLOWING LAYERS:

- * 24 INCH BARRIER PROTECTION LAYER WHICH IS MADE UP OF:
 - * 3 INCHES ASPHALT TOP COURSE OR
 - * 8 INCHES ASPHALT BASE COURSE OR
 - * 13 INCHES SUBBASE COURSE
 - * 6 INCHES VEGETATED TOP SOIL
 - * 18 INCHES SILTY SAND OR OTHER SUITABLE SOIL COVER
- * GEOSYNTHETIC MEMBRANE (40 MIL WITH PERMEABILITY 1×10^{-12} CM/SEC);
- * 3 LAYERS OF GEOSYNTHETIC FILTER FABRIC;
- * 12 INCHES OF GAS VENTING LAYER (PERMEABILITY 1×10^{-3} CM/SEC);
- * CLEAN SOIL FILL OF VARYING THICKNESS TO CONSTRUCT A CAP SYSTEM FOUNDATION WITH A MINIMUM 4.0 PERCENT SLOPE;
- * GAS RISER VENTS EXTENDING FROM WITHIN THE REFUSE MATERIAL TO 3 FT ABOVE THE FINAL GROUND SURFACE ELEVATION (MINIMUM OF ONE GAS RISER VENT PER ACRE); AND
- * CRUSHED STONE BACKFILL AROUND GAS VENTING RISERS.

ALTERNATIVE 2B IS SIMILAR TO ALTERNATIVE 2A EXCEPT FOR THE USE OF GEOSYNTHETIC MEMBRANE WHICH REPLACES THE LOW PERMEABILITY SOIL (CLAY) IN ALTERNATIVE 2A. ALTERNATIVE 2B ALSO HAS 3 LAYERS OF GEOSYNTHETIC FILTER FABRIC INSTEAD OF 2.

ALTERNATIVE 2C: LANDFILL CLOSURE FOR MUNICIPAL LANDFILLS USING A LOW PERMEABILITY ASPHALT CAP

CAPITAL COST: \$21.3 MILLION
 ANNUAL OPERATION AND MAINTENANCE: \$212,000
 ESTIMATED PRESENT WORTH: \$23.3 MILLION
 TIME TO IMPLEMENT THE REMEDIAL ACTION: 24 MONTHS

ALTERNATIVE 2C CONSISTS OF A LOW PERMEABILITY ASPHALT CAP THAT WILL MEET THE 6 NYCRR PART 360 REGULATIONS. THE MINIMUM CAP SECTION UTILIZING ASPHALT FOR THE BARRIER PROTECTION LAYER, WHERE FUTURE LAND USE FOR THE TOWN'S DEPARTMENT OF PUBLIC WORKS IS ANTICIPATED, IS SHOWN IN FIGURE 4. THE MINIMUM CAP SECTION UTILIZING A VEGETATIVE COVER, WHERE FUTURE LAND USE IS NOT ANTICIPATED, IS SHOWN IN FIGURE 5, AND CONSISTS OF THE FOLLOWING LAYERS:

- ! 3 INCHES IMPERMEABLE ASPHALT (PERMEABILITY 1.2×10^{-8} CM/SEC) PLACED IN TWO 1-1/2 INCH LIFTS;
- ! 8 INCHES AGGREGATED BASE COURSE;
- ! 13 INCHES SUBBASE COURSE (GAS VENTING LAYER);
- ! GEOSYNTHETIC FILTER FABRIC;
- ! CLEAN SOIL FILL OF VARYING THICKNESS TO CONSTRUCT A CAP SYSTEM FOUNDATION WITH A MINIMUM 4.0 PERCENT SLOPE;
- ! GAS RISER VENTS EXTENDING FROM WITHIN THE REFUSE MATERIAL TO 3 FT ABOVE THE FINAL GROUND SURFACE ELEVATION (MINIMUM OF ONE GAS RISER VENT PER ACRE); AND
- ! CRUSHED STONE BACKFILL AROUND GAS VENTING RISERS.

ADDITIONAL COMPONENTS OF THE REMEDIAL ACTION COMMON TO ALL OF THE CAPPING ALTERNATIVES

ALL OF THE CAPPING ALTERNATIVES, CONSISTENT WITH NYSDEC CLOSURE REQUIREMENTS, WOULD REQUIRE POST-CLOSURE OPERATION AND MAINTENANCE TO OPERATE AND MAINTAIN THE VEGETATIVE AND ASPHALT COVERS, DRAINAGE STRUCTURES AND GAS VENTING SYSTEMS. IN ADDITION, A GAS, AIR, AND GROUNDWATER MONITORING PROGRAM WOULD BE REQUIRED. INSTITUTIONAL CONTROLS WOULD BE IMPLEMENTED IN ALTERNATIVE 2A, 2B AND 2C AS WELL.

CURRENT NEW YORK STATE LANDFILL CLOSURE REGULATIONS REQUIRE THE INSTALLATION OF A PASSIVE GAS VENTING SYSTEM COMPRISED OF AT LEAST ONE GAS VENT RISER PER ACRE, TO MINIMIZE LANDFILL GAS BUILD UP WITHIN THE FILL. IF LEVELS OF VOCs OR METHANE IN LANDFILL GASES ARE EXPECTED TO BE HIGH, THEN AN ACTIVE SYSTEM WOULD BE APPROPRIATE.

IN GENERAL, METHANE GAS LEVELS MEASURED AT THIS LANDFILL DURING THE RI WERE GENERALLY LOW WITH THE EXCEPTION OF ONE AREA IN THE SOUTHWESTERN PORTION OF THE LANDFILL. LEVELS OF VOCs DETECTED WERE LOWER THAN APPLICABLE ARARS (MAXIMUM CONTAMINANT LEVELS) WITH THE EXCEPTION OF VINYL CHLORIDE WHICH WAS MEASURED SLIGHTLY ABOVE THE ARARS DURING ONE OF THE SAMPLING ROUNDS. CONSIDERING THAT THE LEVELS OF VOCs MEASURED IN LANDFILL SOIL AND GROUNDWATER SAMPLES WERE ALSO EQUAL TO OR BELOW ARARS, IT IS LIKELY THAT THE HIGHER READING MEASURE DURING THAT ONE GAS SAMPLING ROUND IS NOT REPRESENTATIVE OF LANDFILL CONDITIONS. THEREFORE, BASED ON THE LANDFILL CHARACTERISTICS, IT IS ANTICIPATED THAT A PASSIVE GAS VENTING SYSTEM WOULD BE THE APPROPRIATE METHOD FOR GAS CONTROL. HOWEVER, THE PASSIVE GAS SYSTEM WILL BE MONITORED AND SHOULD LEVELS OF VOCs BE DETECTED IN EXCESS OF ARARS EMISSION STANDARDS, THE PASSIVE SYSTEM WILL BE DESIGNED SO THAT IT CAN EASILY BE CONVERTED TO AN ACTIVE SYSTEM. AFTER THE INSTALLATION OF THE FINAL CAP AND VENTING SYSTEM, TWO QUARTERLY ROUNDS OF SAMPLING OF THE GAS VENTS FOR METHANE AND NON-METHANE VOLATILE ORGANIC COMPOUNDS, WILL BE CONDUCTED. THE SAMPLING RESULTS WILL BE UTILIZED TO MAKE A DETERMINATION AS TO WHETHER CONVERSION TO AN ACTIVE SYSTEM AND/OR TREATMENT OF GAS IS NECESSARY.

SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

IN ACCORDANCE WITH THE NATIONAL CONTINGENCY PLAN (NCP), A DETAILED ANALYSIS OF EACH ALTERNATIVE IS REQUIRED. THE PURPOSE OF THE DETAILED ANALYSIS IS TO OBJECTIVELY ASSESS THE ALTERNATIVES WITH RESPECT TO NINE EVALUATION CRITERIA THAT ENCOMPASS STATUTORY REQUIREMENTS AND INCLUDE OTHER GAUGES OF THE OVERALL FEASIBILITY AND ACCEPTABILITY OF REMEDIAL ALTERNATIVES. THIS ANALYSIS IS COMPRISED OF AN INDIVIDUAL ASSESSMENT OF THE ALTERNATIVES AGAINST EACH CRITERION AND A COMPARATIVE ANALYSIS DESIGNED TO DETERMINE THE RELATIVE PERFORMANCE OF THE ALTERNATIVES AND IDENTIFY MAJOR TRADE-OFFS, THAT IS, RELATIVE ADVANTAGES AND DISADVANTAGES, AMONG

THEM.

THE NINE EVALUATION CRITERIA AGAINST WHICH THE ALTERNATIVES ARE EVALUATED ARE AS FOLLOWS:

THRESHOLD CRITERIA - THE FIRST TWO CRITERIA MUST BE SATISFIED IN ORDER FOR AN ALTERNATIVE TO BE ELIGIBLE FOR SELECTION.

1. OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT ADDRESSES WHETHER A REMEDY PROVIDES ADEQUATE PROTECTION AND DESCRIBES HOW RISKS POSED THROUGH EACH PATHWAY ARE ELIMINATED, REDUCED, OR CONTROLLED THROUGH TREATMENT, ENGINEERING CONTROLS, OR INSTITUTIONAL CONTROLS.

2. COMPLIANCE WITH APPLICABLE, OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) IS USED TO DETERMINE WHETHER EACH ALTERNATIVE WILL MEET ALL OF ITS FEDERAL AND STATE ARARS. WHEN AN ARAR IS NOT MET, THE DETAILED ANALYSIS SHOULD DISCUSS WHETHER ONE OF THE SIX STATUTORY WAIVERS IS APPROPRIATE.

PRIMARY BALANCING CRITERIA - THE NEXT FIVE "PRIMARY BALANCING CRITERIA" ARE TO BE USED TO WEIGH MAJOR TRADE-OFFS AMONG THE DIFFERENT HAZARDOUS WASTE MANAGEMENT STRATEGIES.

3. LONG-TERM EFFECTIVENESS AND PERMANENCE FOCUSES ON ANY RESIDUAL RISK REMAINING AT THE SITE AFTER THE COMPLETION OF THE REMEDIAL ACTION. THIS ANALYSIS INCLUDES CONSIDERATION OF THE DEGREE OF THREAT POSED BY THE HAZARDOUS SUBSTANCES REMAINING AT THE SITE AND THE ADEQUACY OF ANY CONTROLS (FOR EXAMPLE, ENGINEERING AND INSTITUTIONAL) USED TO MANAGE THE HAZARDOUS SUBSTANCES REMAINING AT THE SITE.

4. REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT IS THE ANTICIPATED PERFORMANCE OF THE TREATMENT TECHNOLOGIES A PARTICULAR REMEDY MAY EMPLOY.

5. SHORT-TERM EFFECTIVENESS ADDRESSES THE EFFECTS OF THE ALTERNATIVE DURING THE CONSTRUCTION AND IMPLEMENTATION PHASE UNTIL THE REMEDIAL RESPONSE OBJECTIVES ARE MET.

6. IMPLEMENTABILITY ADDRESSES THE TECHNICAL AND ADMINISTRATIVE FEASIBILITY OF IMPLEMENTING AN ALTERNATIVE AND THE AVAILABILITY OF VARIOUS SERVICES AND MATERIALS REQUIRED DURING ITS IMPLEMENTATION.

7. COST INCLUDES ESTIMATED CAPITAL, AND OPERATION AND MAINTENANCE COSTS, BOTH TRANSLATED TO A PRESENT-WORTH BASIS. THE DETAILED ANALYSIS EVALUATES AND COMPARES THE COST OF THE RESPECTIVE ALTERNATIVES, BUT DRAWS NO CONCLUSIONS AS TO THE COST-EFFECTIVENESS OF THE ALTERNATIVES. COST-EFFECTIVENESS IS DETERMINED IN THE REMEDY SELECTION PHASE, WHEN COST IS CONSIDERED ALONG WITH THE OTHER BALANCING CRITERIA.

MODIFYING CRITERIA - THE FINAL TWO CRITERIA ARE REGARDED AS "MODIFYING CRITERIA," AND ARE TO BE TAKEN INTO ACCOUNT AFTER THE ABOVE CRITERIA HAVE BEEN EVALUATED. THEY ARE GENERALLY TO BE FOCUSED UPON AFTER PUBLIC COMMENT IS RECEIVED.

8. STATE ACCEPTANCE REFLECTS THE STATUTORY REQUIREMENT TO PROVIDE FOR SUBSTANTIAL AND MEANINGFUL STATE INVOLVEMENT.

9. COMMUNITY ACCEPTANCE REFERS TO THE COMMUNITY'S COMMENTS ON THE REMEDIAL ALTERNATIVES UNDER CONSIDERATION, ALONG WITH THE PROPOSED PLAN. COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD, AND THE EPA'S RESPONSES TO THOSE COMMENTS, ARE SUMMARIZED IN THE RESPONSIVENESS SUMMARY WHICH IS A PART OF THIS ROD.

THE FOLLOWING IS A SUMMARY OF THE COMPARISON OF EACH ALTERNATIVE'S STRENGTHS AND WEAKNESSES WITH RESPECT TO THE NINE EVALUATION CRITERIA.

1. OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

EACH OF THE CLOSURE ALTERNATIVES WOULD PROVIDE SIMILAR PROTECTION IN REGARDS TO SUBSURFACE GAS, SINCE SIMILAR GAS CONTROL SYSTEMS ARE USED FOR EACH ALTERNATIVE. INSTALLATION OF ANY OF THE MULTI-LAYER IMPERMEABLE CAPS WOULD PROVIDE OVERALL PROTECTION BY EFFECTIVELY PREVENTING PUBLIC EXPOSURE TO THE LANDFILL MATERIALS. THE THREE CAPPING ALTERNATIVES WOULD PREVENT INFILTRATION OF PRECIPITATION INTO THE LANDFILL THEREBY MINIMIZING

LEACHATE PRODUCTION WHICH COULD AFFECT GROUNDWATER.

2. COMPLIANCE WITH ARARS

THE ARARS ARE SEPARATED INTO THREE CATEGORIES: CHEMICAL-SPECIFIC, ACTION-SPECIFIC, AND LOCATION SPECIFIC. BOTH FEDERAL AND STATE ARARS WERE EVALUATED WITH RESPECT TO THEIR APPLICABILITY TO THE FIRST OPERABLE UNIT REMEDIATION ACTIVITIES AT THE LANDFILL, AND ARE LISTED IN TABLES 12 AND 13, RESPECTIVELY.

ALL OF THE LANDFILL CLOSURE ALTERNATIVES WILL COMPLY WITH NEW YORK STATE AIR QUALITY GUIDELINES AND NEW YORK STATE REQUIREMENTS FOR SUBSURFACE GAS CONTROL. HOWEVER, MONITORING OF THE GAS CONTROL SYSTEMS WILL BE REQUIRED TO ENSURE COMPLIANCE WITH NEW YORK STATE AMBIENT AIR QUALITY GUIDELINES. ALTERNATIVES 2A AND 2B WOULD MEET AND EXCEED THE NEW YORK STATE REQUIREMENTS FOR CLOSURE OF SOLID WASTE LANDFILLS. ALTHOUGH ALTERNATIVE 2C IS ALSO CONSISTENT WITH THE STATE LANDFILL CLOSURE REGULATIONS, NYSDEC MAY REQUIRE A LONGER REVIEW PROCESS PRIOR TO APPROVAL, BECAUSE THE STATE'S CLOSURE REGULATIONS DO NOT SPECIFICALLY AUTHORIZE THE PROPOSED CAPPING MATERIAL SPECIFIED IN ALTERNATIVE 2C.

SINCE THE LANDFILL CEASED OPERATIONS IN JANUARY 1975, PRIOR TO THE EFFECTIVE DATE OF THE RESOURCE CONSERVATION AND RECOVERY ACT ("RCRA") SUBTITLE C REGULATIONS (NOVEMBER 19, 1980), AND THE REMEDY DOES NOT INVOLVE THE DISPOSAL OF RCRA-REGULATED WASTE, THE RCRA SUBTITLE C CLOSURE STANDARDS ARE NOT APPLICABLE. HOWEVER, INFORMATION AVAILABLE INDICATES THAT HAZARDOUS SUBSTANCES DISPOSED OF AT THE LANDFILL MAY BE SIMILAR TO RCRA WASTES. IN ADDITION, THE PURPOSE OF SOME OF THE RCRA CLOSURE REQUIREMENTS IS SIMILAR TO THE PURPOSE OF THIS CERCLA ACTION. FOR THESE AND OTHER REASONS, CERTAIN OF THE RCRA SUBTITLE C CLOSURE REQUIREMENTS, ALTHOUGH NOT APPLICABLE, ARE RELEVANT AND APPROPRIATE FOR THE REMEDIAL ACTION AT THIS LANDFILL.

THE CLOSURE ALTERNATIVES EVALUATED WILL COMPLY WITH ALL PROVISIONS OF THE RCRA HAZARDOUS WASTE LANDFILL CLOSURE REGULATIONS WHICH ARE RELEVANT AND APPROPRIATE TO THE LANDFILL; SPECIFICALLY, 40 CFR PART 264, SUBPART N, SECTIONS 264.303 AND 264.310, AS WELL AS THE NYS PART 360 REGULATIONS FOR CLOSURE.

DUE TO THE CURRENT LIMITED THREAT FOR DIRECT CONTACT WITH THE LANDFILL WASTES, THE APPROPRIATE CLOSURE REGULATIONS INCLUDE THE NEW YORK STATE CLOSURE REQUIREMENTS SPECIFIED IN 6 NYCRR PART 360, SOLID WASTE MANAGEMENT FACILITIES REGULATIONS. THIS TYPE OF CLOSURE, WHICH INCORPORATES SOLID WASTE AND HAZARDOUS WASTE REGULATORY REQUIREMENTS, IS OFTEN CALLED "ALTERNATE LANDFILL CLOSURE".

RCRA LAND DISPOSAL RESTRICTIONS (LDRS) PRECLUDE THE PLACEMENT OF RESTRICTED RCRA HAZARDOUS WASTE INTO A LAND DISPOSAL UNIT. FOR THE LDRS TO BE APPLICABLE TO A CERCLA RESPONSE, THE ACTION MUST CONSTITUTE PLACEMENT OF A RESTRICTED RCRA HAZARDOUS WASTE. BECAUSE THE WASTE IS BEING CAPPED IN PLACE, LDRS DO NOT APPLY.

3. LONG-TERM EFFECTIVENESS

LANDFILL CAPPING IS CONSIDERED A RELIABLE OPTION FOR LOW LEVEL CONTAMINANTS AND IF PROPERLY INSTALLED, A CAP SYSTEM IS EXPECTED TO CONTINUE TO PROVIDE A HIGH LEVEL OF PROTECTION. EACH OF THE CAP ALTERNATIVES WILL BE EQUALLY EFFECTIVE IN ACHIEVING THEIR OBJECTIVE OF ELIMINATING CONTACT WITH LANDFILL SOIL AND REDUCING THE RISK OF CONTAMINANT MIGRATION AS A RESULT OF LEACHATE GENERATED BY SURFACE PRECIPITATION.

HOWEVER, ALTERNATIVE 2B IS THE MOST EFFECTIVE COVER SYSTEM FOR MINIMIZING LEACHATE PRODUCTION SINCE ITS GEOSYNTHETIC BARRIER AND ASPHALT COVER PROVIDES AN INITIAL EFFICIENCY OF 99.43 PERCENT. ALTERNATIVE 2A HAS AN INTERMEDIATE EFFECTIVENESS IN REDUCING LEACHATE GENERATION (TOTAL CAP EFFICIENCY = 99.04 PERCENT), WHILE ALTERNATIVE 2C WILL BE LEAST EFFECTIVE (CAP EFFICIENCY = 91.40 PERCENT).

ALTERNATIVE 2A PROVIDES MINIMAL POTENTIAL FOR CAP FAILURE SINCE THE LOW PERMEABILITY CLAY HAS SELF-SEALING PROPERTIES WHICH MINIMIZE FAILURE CAUSED BY FREEZING AND LANDFILL SETTLEMENT. DIFFERENTIAL SETTLING OF THE LANDFILL WASTES WITH SUBSEQUENT DETRIMENTAL EFFECTS ON ANY COVER SYSTEM INSTALLED WOULD BE EXPECTED. ALTERNATIVE 2B HAS AN INTERMEDIATE POTENTIAL FOR FAILURE BOTH DURING AND AFTER CONSTRUCTION DUE TO PUNCTURES AND TEARS. ALTERNATIVE 2C MAINTAINS THE GREATEST POTENTIAL FOR FAILURE DUE TO FREEZING AND CRACKING, HOWEVER, SINCE THE CAPPING MATERIAL IS AT THE SURFACE, CRACKS CAN BE EASILY IDENTIFIED AND REPAIRED QUICKLY. UNLIKE ALTERNATIVES 2A AND 2C, THE USEFUL LIFE OF GEOSYNTHETIC MEMBRANES USED IN ALTERNATIVE 2B IS UNKNOWN AND THE MEMBRANE MAY HAVE TO BE REPLACED SOMETIME IN THE FUTURE.

IN AREAS WHERE VEGETATIVE COVER WILL BE UTILIZED, FROST ACTION CAN DAMAGE THE BARRIER LAYER AND REDUCE ITS EFFECTIVENESS. ALTERNATIVE 2A HAS THE GREATEST POTENTIAL FOR FROST DAMAGE BECAUSE IT IS NOT PROTECTED BY ADDITIONAL COVER OR A GEOSYNTHETIC MEMBRANE. ALTERNATIVE 2B SHOULD BE THE LEAST AFFECTED BY FROST BECAUSE IT INCLUDES GEOSYNTHETIC MATERIALS.

4. REDUCTION OF TOXICITY, MOBILITY, OR VOLUME

NONE OF THE ALTERNATIVES UTILIZE TREATMENT OF WASTE TO REDUCE TOXICITY, MOBILITY, OR VOLUME. HOWEVER, ALL OF THE CAPPING ALTERNATIVES WOULD REDUCE THE VOLUME OF LEACHATE BEING GENERATED IN THE LANDFILL BY PREVENTING INFILTRATION OF RAINWATER INTO THE WASTE.

5. SHORT-TERM EFFECTIVENESS

THERE ARE SLIGHT DIFFERENCES IN SHORT-TERM EFFECTIVENESS BETWEEN THE CLOSURE ALTERNATIVES. ALTERNATIVES 2A, 2B, AND 2C HAVE MINOR SHORT-TERM EFFECTS ON THE SURROUNDING COMMUNITY, INCLUDING INCREASED VEHICULAR TRAFFIC, A SLIGHT INCREASE IN NOISE LEVEL FROM CONSTRUCTION EQUIPMENT, AND FUGITIVE DUST EMISSIONS. MEASURES WOULD BE TAKEN TO MINIMIZE THESE IMPACTS FOR THE CONSTRUCTION PERIODS, WHICH VARY AMONG CLOSURE ALTERNATIVE AS FOLLOWS ALTERNATIVE 2A: 36 MONTHS; ALTERNATIVE 2B: 30 MONTHS; AND ALTERNATIVE 2C: 24 MONTHS. IN ADDITION, WITH THE USE OF ALTERNATIVE 2C, NO PENETRATION OF OR ENCOUNTER WITH THE LANDFILL WASTES SHOULD OCCUR. THE THICKNESS OF THE EXISTING LANDFILL COVER MATERIAL IS REPORTED TO VARY FROM SIX INCHES TO FORTY-EIGHT INCHES. THEREFORE, ENCOUNTERS WITH LANDFILL WASTE MATERIAL FOR ALTERNATIVE 2C WILL BE LIMITED TO THE INSTALLATION OF GAS VENT PIPING, SINCE THE CAP DEPTH FOR THIS ALTERNATIVE IS ONLY TWENTY-FOUR INCHES. ALTERNATIVES 2A AND 2B, HOWEVER, HAVE GREATER DEPTHS, WHICH MAY REQUIRE A MINIMAL EXCAVATION OF LANDFILL WASTE MATERIALS. THIS EXCAVATION MAY WARRANT THE USE OF AIR MONITORING EQUIPMENT AND POSSIBLY THE USE OF PROTECTIVE RESPIRATORY EQUIPMENT DURING CONSTRUCTION ACTIVITIES.

6. IMPLEMENTABILITY

ALTERNATIVES 2A, 2B AND 2C ARE ALL TECHNICALLY AND ADMINISTRATIVELY FEASIBLE. THE MAJORITY OF THE MATERIALS AND SERVICES FOR ALL OF THE ALTERNATIVES ARE READILY AVAILABLE.

ALTERNATIVE 2A UTILIZES A CLAY COVER SYSTEM THAT IS A PROVEN AND RELIABLE LANDFILL CLOSURE TECHNOLOGY. ALTHOUGH THE MAJORITY OF THE MATERIALS AND SERVICES FOR ALTERNATIVE 2A ARE READILY AVAILABLE, 1 X (10-7) CM/SEC CLAY IS NO LONGER AVAILABLE LOCALLY. ALTERNATIVE 2B UTILIZES A GEOSYNTHETIC MEMBRANE COVER SYSTEM WHICH IS CONSIDERED A PROVEN AND RELIABLE TECHNOLOGY, ALTHOUGH ITS USEFUL LIFE MAY BE UNCERTAIN. ALTERNATIVE 2C IS THE MOST EASILY IMPLEMENTED CLOSURE ALTERNATIVE SINCE THE ACTUAL DEPTH OF THE CAP IS ESTIMATED TO BE TWENTY-FOUR INCHES. THE OTHER TWO CAPPING ALTERNATIVES HAVE GREATER DEPTHS.

7. COST

CAPITAL COST IS THE PRESENT VALUE FOR IMPLEMENTING THE REMEDIAL ACTION. ANNUAL OPERATION AND MAINTENANCE ("O&M") COSTS ARE USED TO QUANTIFY THE YEARLY EXPENSE OF O&M. THE 30 YEAR ANNUAL COST IS THEN CALCULATED AND EXPRESSED IN CURRENT VALUE TERMS. ALTERNATIVE 2C HAS THE LOWEST CAPITAL COST WHILE ALTERNATIVE 2A HAS THE HIGHEST. THE ESTIMATED CAPITAL COST FOR EACH OF THE CLOSURE ALTERNATIVES ARE AS FOLLOWS:

* ALTERNATIVE 2A	* \$30.3 MILLION
* ALTERNATIVE 2B	* \$24.1 MILLION
* ALTERNATIVE 2C	* \$21.3 MILLION

ALTERNATIVE 2A COSTS ARE SENSITIVE TO THE AVAILABILITY AND PRICES FOR CLEAN FILL AND 1 X (10-7) CM/SEC CLAY. CURRENTLY THIS CLAY IS NOT LOCALLY AVAILABLE, WHICH ACCOUNTS FOR THE HIGH COST FOR ALTERNATIVE 2A. ALTERNATIVE 2B IS SENSITIVE TO THE AVAILABILITY AND UNIT PRICES FOR CLEAN FILL MATERIAL AND GEOSYNTHETIC MEMBRANES. ALTERNATIVE 2C COSTS ARE SENSITIVE TO THE AVAILABILITY AND UNIT PRICES FOR CLEAN FILL AND LOW PERMEABILITY ASPHALT.

THE ANNUAL O&M COST FOR EACH ALTERNATIVE ARE ESTIMATED AS FOLLOWS:

* ALTERNATIVE 2A	* \$280,000
* ALTERNATIVE 2B	* \$222,000
* ALTERNATIVE 2C	* \$212,000

DETAILED COST FIGURES FOR EACH ALTERNATIVE ARE INCLUDED IN TABLE 14.

8. STATE ACCEPTANCE

THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION CONCURS WITH THE SELECTED REMEDY.

9. COMMUNITY ACCEPTANCE

ALL COMMENTS SUBMITTED DURING THE PUBLIC COMMENT PERIOD WERE EVALUATED AND ARE ADDRESSED IN THE ATTACHED RESPONSIVENESS SUMMARY.

#SD

X. STATUTORY DETERMINATIONS

1. PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

THE SELECTED REMEDY IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT, SINCE IT PROVIDES PROTECTION FOR SITE SURFACE SOILS AND GAS CONTROL AND MAINTAINS THE HIGHEST CAP EFFICIENCY. THE FENCING, INSTITUTIONAL CONTROL AND CAPPING ALL PROVIDE PROTECTION FROM DIRECT CONTACT WITH CONTAMINATED MATERIALS. CAPPING OF THE LANDFILL ALSO REDUCES THE EMISSIONS OF METHANE AND VOCs AND REDUCES PERCOLATION OF PRECIPITATION THROUGH THE LANDFILL AND THUS THE MIGRATION OF HAZARDOUS SUBSTANCES INTO GROUNDWATER. MONITORING OF THE GROUNDWATER WILL IDENTIFY ANY FAILURES OF THE CONTAINMENT SYSTEM. THE SELECTED REMEDY WILL NOT POSE UNACCEPTABLE SHORT-TERM RISKS.

2. COMPLIANCE WITH ARARS

THE SELECTED REMEDY WILL COMPLY WITH ALL APPLICABLE OR RELEVANT AND APPROPRIATE FEDERAL AND STATE REQUIREMENTS.

THE LANDFILL CAPPING AND THE LONG-TERM MONITORING WILL MEET THE NYCRR PART 360 LANDFILL CLOSURE REQUIREMENTS FOR A SOLID WASTE FACILITY AND WILL COMPLY WITH ALL PROVISIONS OF RCRA HAZARDOUS WASTE LANDFILL CLOSURE REGULATIONS WHICH ARE RELEVANT AND APPROPRIATE TO THE LANDFILL.

NEW YORK STATE POLLUTION CONTROL REGULATIONS, 6 NYCRR PARTS 201, 202 AND 219, WITH REGARD TO AIR EMISSIONS WILL BE COMPLIED WITH AS WELL.

3. COST-EFFECTIVENESS

THE SELECTED REMEDY IS PRESCRIBED BY COMPLIANCE WITH STATE AND FEDERAL SOLID WASTE LANDFILL CLOSURE ARARS. THE CHOSEN ALTERNATIVE IS COST-EFFECTIVE BECAUSE IT HAS BEEN DEMONSTRATED TO PROVIDE AN OVERALL EFFECTIVENESS PROPORTIONAL TO ITS COST.

A COST ANALYSIS WAS DONE TO ESTIMATE A RANGE OF COSTS FOR CAPITAL AND ANNUAL OPERATION AND MAINTENANCE. THE RANGE OF ESTIMATED COSTS CONSIDERS WHETHER THE COVER MATERIALS ARE READILY AVAILABLE IN THE VICINITY OF THE LANDFILL. THE FINAL CONSTRUCTION COST IS EXPECTED TO FALL WITHIN THE RANGE OF COSTS PROVIDED.

4. UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

EPA AND THE STATE OF NEW YORK HAVE DETERMINED THAT THE SELECTED REMEDY REPRESENTS THE MAXIMUM EXTENT TO WHICH PERMANENT SOLUTIONS AND TREATMENT TECHNOLOGIES CAN BE UTILIZED IN A COST EFFECTIVE MANNER FOR THE REMEDIATION OF THE LANDFILL. ASSUMING THAT THE THRESHOLD CRITERIA OF "OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT" AND "COMPLIANCE WITH ARARS" WERE MET, THE CRITICAL DECISIONAL ROLE WAS GIVEN TO THE FIVE BALANCING CRITERIA OF "LONG-TERM EFFECTIVENESS AND PERMANENCE", "REDUCTION OF TOXICITY, MOBILITY, OR VOLUME",

" SHORT-TERM EFFECTIVENESS", "IMPLEMENTABILITY", AND "COST." THE BALANCING CRITERIAS ARE SUMMARIZE BELOW TO ASSESS THEIR COLLECTIVE IMPACTS ON THE REMEDY SELECTION PROCESS. FIRST, "LONG-TERM EFFECTIVENESS" AS A FACTOR IN THE SELECTED REMEDY IS ADEQUATE IN TERMS OF THE DEGREE OF PERMANENCE WHICH IT OFFERS. HOWEVER, LONG-TERM MONITORING WILL BE REQUIRED TO INSURE THAT ENGINEERING CONTROLS ARE PERFORMING AS INTENDED. THE SELECTED ALTERNATIVE IS THE MOST PROTECTIVE ALTERNATIVE WITH RESPECT TO FUTURE LEACHATE PRODUCTION. OTHER OPTIONS SUCH AS INCINERATION OR IN-SITU TREATMENT ARE EITHER DEFICIENT ON THE LONG- TERM BASIS OR AS IN THE CASE OF IN-SITU TREATMENT IS TECHNICALLY IMPRACTICAL. INCINERATION OFFERS A VERY HIGH DEGREE OF PERMANENCE AT A VERY HIGH COST. THE "REDUCTION OF TOXICITY, MOBILITY OR VOLUME" WILL BE ACHIEVED TO SOME DEGREE BY REDUCING THE VOLUME OF LEACHATE BEING GENERATED IN THE LANDFILL BY PREVENTING INFILTRATION OF PRECIPITATION INTO THE WASTE. OTHER OPTIONS SUCH AS INCINERATION WOULD BE HIGHLY EFFECTIVE BUT IT WOULD BE IMPRACTICAL BECAUSE OF THE VOLUME OF WASTE PRESENT AND THE OVERREACHING COST FACTOR (\$26.2 MILLION VERSUS \$1 BILLION). REGARDING "SHORT-TERM EFFECTIVENESS", THE SELECTED REMEDY WOULD ACHIEVE THE REMEDIATION GOAL IN A SHORTER PERIOD OF TIME (30 MONTHS) WITHOUT ANY UNCONTROLLABLE EXCAVATION, WHILE INCINERATION OR IN-SITU TREATMENT OPTIONS WOULD TAKE FAR LONGER, UP TO 15 YEARS, BEFORE THE REQUISITE GOALS ARE ATTAINED. IN TERMS OF "IMPLEMENTABILITY", THE SELECTED REMEDY WILL UTILIZE A PROVEN TECHNOLOGY, WHILE OTHER OPTIONS SUCH AS IN-SITU TREATMENT WOULD NOT BE EFFECTIVE FOR THE LOW CONCENTRATIONS OF CONTAMINANTS FOUND AT THE LANDFILL.

5. PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENTS

THE SELECTED REMEDY DOES NOT SATISFY THE STATUTORY PREFERENCE FOR TREATMENT BECAUSE IT IS IMPRACTICAL TO DO SO AND NOT COST-EFFECTIVE. THE LANDFILL WASTES ARE THE PRINCIPAL THREAT AT THE SITE. THE EXACT LOCATION OF ANY HAZARDOUS WASTE THAT MAY HAVE BEEN DISPOSED OF AT THE LANDFILL IS UNKNOWN. THEREFORE, THE ENTIRE LANDFILL VOLUME, APPROXIMATELY 3 MILLION CUBIC YARDS, PLACED AT DEPTHS OF UP TO 90 FEET BELOW GROUND SURFACE, WOULD REQUIRE EXCAVATION AND REMOVAL IN ORDER TO EFFECTIVELY TREAT THE WASTE. THIS EXCAVATION OF SUCH A LARGE VOLUME OF WASTE IS COST-PROHIBITIVE. FURTHERMORE, IN-SITU TREATMENT OF WASTE IS TECHNICALLY IMPRACTICAL BECAUSE NO DISCRETE AREAS, CONTAMINATED BY HIGH LEVELS OF AN IDENTIFIABLE WASTE TYPE WHICH REPRESENTED A PRINCIPAL THREAT TO PUBLIC HEALTH OR THE ENVIRONMENT, WERE LOCATED. RESULTS FROM THE OU 1 RI OBSERVED LOW CONCENTRATION CONTAMINANTS DISPERSED THROUGHOUT THE LANDFILL. "HOT SPOTS" WHICH MAY HAVE BEEN AMENABLE TO TREATMENT, WERE NOT LOCATED.

#RS

RESPONSIVENESS SUMMARY

THIS COMMUNITY RELATIONS RESPONSIVENESS SUMMARY IS DIVIDED INTO THE FOLLOWING SECTIONS:

OVERVIEW: THIS SECTION DISCUSSES EPA'S PREFERRED ALTERNATIVE OR REMEDIAL ACTION.

BACKGROUND: THIS SECTION PROVIDES A BRIEF HISTORY OF COMMUNITY INTEREST AND CONCERNS RAISED DURING REMEDIAL PLANNING AT THE SYOSSET LANDFILL SITE.

PART I: THIS SECTION PROVIDES A SUMMARY OF COMMENTORS MAJOR ISSUES AND CONCERNS, AND EXPRESSLY ACKNOWLEDGE AND RESPONDS TO THOSE RAISED BY THE LOCAL COMMUNITY. "LOCAL COMMUNITY" MAY INCLUDE LOCAL HOMEOWNERS, BUSINESSES, THE MUNICIPALITY, AND NOT INFREQUENTLY, POTENTIALLY RESPONSIBLE PARTIES (PRPS).

PART II: THIS SECTION PROVIDES A COMPREHENSIVE RESPONSE TO ALL SIGNIFICANT COMMENTS AND IS COMPRISED OF THE SPECIFIC LEGAL AND TECHNICAL QUESTIONS RAISED DURING THE PUBLIC COMMENT PERIOD.

ANY POINTS OF CONFLICT OR AMBIGUITY BETWEEN INFORMATION PROVIDED IN PARTS I AND II OF THIS RESPONSIVENESS SUMMARY WILL BE RESOLVED IN FAVOR OF THE DETAILED TECHNICAL AND LEGAL PRESENTATION CONTAINED IN PART II. AS AN ADDITIONAL RESOURCE, THE TRANSCRIPT TO THE PUBLIC MEETING HELD ON AUGUST 15, 1990 IS ATTACHED AS APPENDIX A. SOME EPA RESPONSES IN THE RESPONSIVENESS SUMMARY CLARIFY ANSWERS GIVEN AT THE AUGUST 15, 1990 PUBLIC MEETING, AS REPORTED IN APPENDIX A.

OVERVIEW

AT THE TIME OF THE PUBLIC COMMENT PERIOD, EPA PUBLISHED ITS PREFERRED ALTERNATIVE FOR THE SYOSSET LANDFILL SUPERFUND SITE LOCATED IN SYOSSET, NEW YORK. EPA GENERALLY PREFERS TREATMENT OR REMOVAL TECHNOLOGIES WHICH

REDUCE THE TOXICITY, MOBILITY, OR VOLUME OF WASTE CONTAMINANTS. IN THE CASE OF LARGE LANDFILLS, HOWEVER, THE SHEER QUANTITY OF WASTE MAKES SUCH METHODS PROHIBITIVE. THIS WAS PARTICULARLY TRUE FOR THE SYOSSET LANDFILL WHERE SIZE AND THE LOW LEVEL OF CONTAMINANTS PRESENT RENDERED TREATMENT OR REMOVAL OF SITE MATERIALS IMPRACTICAL.

EPA SCREENED POSSIBLE ALTERNATIVES, GIVING CONSIDERATION TO NINE KEY CRITERIA:

THRESHOLD CRITERIA, INCLUDING

- ! OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT
- ! COMPLIANCE WITH FEDERAL, STATE, AND LOCAL ENVIRONMENTAL AND HEALTH LAWS

BALANCING CRITERIA, INCLUDING

- ! LONG-TERM EFFECTIVENESS
- ! SHORT-TERM EFFECTIVENESS
- ! REDUCTION OF MOBILITY, TOXICITY, OR VOLUME
- ! ABILITY TO IMPLEMENT
- ! COST, AND

MODIFYING CRITERIA, INCLUDING

- ! STATE ACCEPTANCE, AND
- ! LOCAL ACCEPTANCE.

EPA WEIGHED STATE AND LOCAL ACCEPTANCE OF THE REMEDY PRIOR TO REACHING THE FINAL DECISION REGARDING THE REMEDY FOR THE SITE.

THE AGENCY'S SELECTED REMEDY IS ALTERNATIVE 2B, THE MULTIPLE-LAYER CAPPING METHOD WHICH MAKES USE OF A GEOSYNTHETIC MEMBRANE. THE CAP'S BARRIER PROTECTION LAYER WILL CONSIST OF ASPHALT IN AREAS TO BE USED BY THE TOWN PUBLIC WORKS DEPARTMENT AND VEGETATION IN ALL NON-USE AREAS. EPA BELIEVES THE 2B ALTERNATIVE PROVIDES THE BEST CAP EFFICIENCY, PROTECTING AGAINST INFILTRATION OF WATER INTO THE LANDFILL, AND ACHIEVES THE BEST OVERALL BALANCE AMONG THE NINE CRITERIA.

BACKGROUND

COMMUNITY INTEREST AND CONCERN ABOUT THE SITE HAS BEEN RELATIVELY STEADY OVER THE PAST SEVERAL YEARS.

TO OBTAIN PUBLIC INPUT ON THE FEASIBILITY STUDY REPORT AND THE PROPOSED REMEDY, EPA HELD A PUBLIC COMMENT PERIOD FROM JULY 28 TO AUGUST 28, 1990.

EPA'S COMMUNITY RELATIONS EFFORTS INCLUDED PREPARATION OF A COMMUNITY RELATIONS PLAN IN DECEMBER 1986; AN INFORMATIONAL MEETING ON THE REMEDIAL INVESTIGATION AND FEASIBILITY STUDY (RI/FS) WITH THE BIRCHWOOD CIVIC ASSOCIATION ON MAY 19, 1987 AND ON LATER OCCASIONS; AND THE ESTABLISHMENT OF SITE INFORMATION REPOSITORIES LOCATED AT THE OYSTER BAY TOWN HALL AND THE SYOSSET PUBLIC LIBRARY WHICH CONTAIN THE RI/FS REPORT AND OTHER RELEVANT DOCUMENTS; AND A PUBLIC MEETING NOTICE THAT APPEARED IN THE JULY 28, 1990 EDITION OF NEWSDAY. IN ADDITION, EPA PREPARED A FACT SHEET, DESCRIBING THE AGENCY'S PROPOSED REMEDIAL ACTION PLAN FOR THE SITE. THIS PROPOSED PLAN FACT SHEET WAS SENT TO THE INFORMATION REPOSITORY AND DISTRIBUTED TO CITIZENS AND OFFICIALS NOTED ON EPA'S SITE MAILING LIST IN JULY 1990; A PUBLIC MEETING WAS HELD ON AUGUST 15, 1990. APPROXIMATELY 30 PEOPLE ATTENDED THE PUBLIC MEETING. THOSE IN ATTENDANCE INCLUDED LOCAL AREA RESIDENTS, STATE, COUNTY, AND LOCAL OFFICIALS, LOCAL SCHOOL OFFICIALS, NEWS MEDIA REPRESENTATIVES, REPRESENTATIVES FROM EPA, AND REPRESENTATIVES FROM COMPANIES INTERESTED IN THE SITE ACTIVITIES AND CLEANUP DECISIONS. EPA ALSO MAINTAINED CONTACT WITH LOCAL OFFICIALS AND CITIZEN LEADERS THROUGHOUT THE REMEDY SELECTION PROCESS.

PART I: SUMMARY OF COMMENTORS' MAJOR ISSUES AND CONCERNS

THIS SECTION PROVIDES A SUMMARY OF COMMENTORS' MAJOR ISSUES AND CONCERNS, AND EXPRESSLY ACKNOWLEDGES AND

RESPONDS TO THOSE RAISED BY THE LOCAL COMMUNITY. THE MAJOR ISSUES AND CONCERNS REGARDING THE PROPOSED REMEDY FOR THE SYOSSET LANDFILL SITE WERE RECEIVED AT THE PUBLIC MEETING ON AUGUST 15, 1990, AND DURING THE PUBLIC COMMENT PERIOD. THESE CONCERNS FALL INTO THE FOLLOWING CATEGORIES.

- A. EXTENT AND MIGRATION OF CONTAMINANTS
- B. HEALTH AND SAFETY
- C. ON-SITE MONITORING
- D. COST AND LIABILITY
- E. FUTURE PLANS FOR SITE USE

A SUMMARY OF THE COMMENTS AND EPA'S RESPONSE TO THEM IS PROVIDE BELOW.

- A. EXTENT AND MIGRATION OF CONTAMINANTS

A CITIZEN REFERRED TO PAGE 26 OF THE VERSAR REPORT WHICH NOTED THAT NO ANALYSES OF SURFACE WATER OR SURFACE SOIL WERE AVAILABLE. THE CITIZEN COMMENTED THAT WATER AND GASEOUS VAPORS CAN BE OBSERVED RISING OUT OF THE LANDFILL AND THAT CONTAMINATED DUST WAS NOT ADDRESSED IN THE RI. THE CITIZEN ASKED IF THESE ANALYSES WOULD BE CONDUCTED?

EPA RESPONSE: SURFACE SOIL TESTING IS UNNECESSARY BECAUSE THE LANDFILL WILL BE CAPPED, THEREFORE NO ONE CAN COME INTO CONTACT WITH SOILS AT THE LANDFILL WITH RESPECT TO TESTING SURFACE WATER ON THE SITE, EPA CONCLUDED DURING THE OPERABLE UNIT ONE RI THAT DUE TO THE SITE'S LOCATION IN A DEPRESSION, NO SURFACE WATER WOULD LEAVE THE SITE. FURTHERMORE, EPA CONCLUDED THAT THE SMALL STANDING PONDS ON THE SITE WERE INSUFFICIENT TO SAMPLE. IN ADDITION, THE PROPOSED REMEDY INCLUDES REGRADING THE LANDFILL SURFACE TO ELIMINATE STANDING WATER.

A CITIZEN REFERRED TO PAGE 54 OF THE VERSAR REPORT STATING THAT WELLS IN THE LANDFILL AREA ARE CONSIDERED TO BE POTENTIALLY AFFECTED. THE CITIZEN ASKED WHAT STUDIES WOULD BE PERFORMED ON THE WELLS.

EPA RESPONSE: OPERABLE UNIT TWO WILL INCLUDE GROUNDWATER WELL SAMPLING. IN ADDITION, THE NASSAU COUNTY HEALTH DEPARTMENT ROUTINELY SAMPLES ALL PUBLIC WATER SUPPLY WELLS.

REFERRING TO A STATEMENT ON PAGE 49 OF THE RI/FS INDICATING THAT THE LANDFILL IS A CONTINUING SOURCE OF CONTAMINATION INTO A SOLE SOURCE AQUIFER, A CITIZEN ASKED WHY WELLS N4L33 AND N4246 WERE CLOSED AND WHETHER A LEACHATE PROBLEM EXISTED.

EPA RESPONSE: WE ARE INFORMED THAT THE WELLS WERE CLOSED BY THE HEALTH DEPARTMENT BECAUSE OF A TASTE AND ODOR PROBLEM. BECAUSE WE ARE NOT SURE HOW FAR LEACHATE HAS TRAVELED OFF THE SITE, OPERABLE UNIT TWO WILL INCLUDE SAMPLING TO DETERMINE WHETHER LEACHATE IS A PROBLEM AFFECTING AREA WELLS.

AN ATTENDEE ASKED WHETHER GROUNDWATER SAMPLING HAD BEEN PERFORMED ON THE SOUTH SIDE OF THE SITE.

EPA RESPONSE: YES. THE SITE IS SURROUNDED BY GROUND-WATER MONITORING WELLS, WHICH WERE SAMPLED AND ANALYZED.

AN ATTENDEE STATED THAT THE RI/FS REPORT WAS CONFUSING WITH RESPECT TO THE PRESENCE OF A CONTAMINANT PLUME. TWO PORTIONS OF THE REPORT DIFFERED ON WHETHER A PLUME WAS PRESENT. THE ATTENDEE ASKED WHETHER THIS WOULD BE STUDIED FURTHER IN OPERABLE UNIT TWO.

EPA RESPONSE: YES. THIS WILL BE STUDIED FURTHER. A PLUME DOES EXIST, WHICH CONSISTS OF COMPOUNDS TYPICALLY ASSOCIATED WITH LANDFILLS, SUCH AS SODIUM CHLORIDE, SULFATES, NITRATES, AND SALTS. THESE COMPOUNDS ARE NOT HAZARDOUS AT THE LEVELS `RESENT AT THE SYOSSET LANDFILL. OTHER COMPOUNDS, FOR EXAMPLE, VOLATILE ORGANIC COMPOUNDS, WERE FOUND IN THE SOILS AND GROUNDWATER. THE STUDIES PERFORMED THUS FAR ON THE SITE DID NOT CORRELATE THOSE COMPOUNDS WITH THE LEACHATE PLUME. SAMPLING STUDIES IN OPERABLE UNIT TWO WILL ANALYZE THESE FINDINGS FURTHER.

B. HEALTH AND SAFETY

A CITIZEN EXPRESSED CONCERN REGARDING RI/FS CANCER RISK ANALYSIS WHICH WAS BASED ON AN INDIVIDUAL LIVING IN THE AREA FOR APPROXIMATELY NINE YEARS. STATING THAT SOME COMMUNITY MEMBERS HAVE LIVED THERE FOR 34 YEARS, INCLUDING CHILDREN WHO HAVE LIVED NEAR THE SITE SINCE BIRTH AND ATTENDED THE SOUTH GROVE SCHOOL. THE CITIZEN STATED THAT AT LEAST TWO RESIDENTS HAVE DIED FROM CANCERS USUALLY ASSOCIATED WITH CHEMICAL RISKS. THE CITIZEN ASKED WHETHER A COMPREHENSIVE CANCER RISK STUDY WILL BE DONE ON RESIDENTS WITHIN A ONE-MILE RADIUS OF THE SITE OVER THE LAST FIFTEEN TO TWENTY YEARS.

EPA RESPONSE: REPRESENTATIVES OF THE NEW YORK STATE HEALTH DEPARTMENT HAVE INFORMED EPA THAT NO CANCER INCIDENCE STUDIES HAVE BEEN PERFORMED FOR NASSAU COUNTY SPECIFIC TO PROXIMITY TO THE LANDFILL.

EPA HAS PRESENTED CANCER RISK AS A REASONABLE WORST CASE ANALYSIS FOR ALL OF THE EXPOSURE SCENARIOS EVALUATED IN THE HEALTH AND ENDANGERMENT ASSESSMENT REPORT. THE DEVELOPMENT OF THESE SCENARIOS INCORPORATES BOTH SCIENTIFIC STUDIES AND STATISTICAL METHODS TO PRODUCE A REASONABLE AVERAGE RISK NUMBER FOR THE LOCAL POPULATION. THE NINE-YEAR EXPOSURE DURATION REPRESENTED THE NATIONAL MEDIAN TIME AN INDIVIDUAL SPENDS AT ONE RESIDENCE. ALTHOUGH THERE ARE PEOPLE WHO LIVE IN THE SYOSSET AREA FOR LONGER AND SHORTER PERIODS OF TIME, IT IS NOT FEASIBLE TO STUDY EACH INDIVIDUAL. IN ADDITION THE ACTUAL RESIDENCE TIME IS NOT THE ONLY TIME FRAME INCORPORATED INTO THE ANALYSIS. FOR EXAMPLE, A PERSON DOES NOT STAY IN THEIR RESIDENCE 24 HOURS A DAY; THEY MAY TRAVEL TO WORK FOR SEVERAL HOURS OUT OF THE DAY. THERE ARE MANY OTHER FACTORS THAT FIGURE INTO THE RISK EQUATION, INCLUDING SENSITIVITY OF THE POPULATION, TYPE OF CHEMICAL EXPOSED, MEANS OF EXPOSURE, ETC. RISK ESTIMATION USES STATISTICAL METHODS THAT INCORPORATE AVERAGING. THESE ARE EPA RECOMMENDED PROCEDURES THAT ALLOW COMPARISONS BETWEEN EXPOSURE SCENARIOS AND SITES.

C. ON-SITE MONITORING

ONE ATTENDEE NOTED THAT THE REPORT INDICATES THAT TWO GAS SNIFFERS NEAR THE SOUTH GROVE SCHOOL ANNEX REVEAL NO LEAKAGE OF METHANE OR OTHER GASES. THE ATTENDEE STATED THAT FROM TIME TO TIME THE MONITORING SNIFFERS ARE INOPERABLE AND ASKED WHETHER THE EQUIPMENT OPERATION WOULD BE EVALUATED OR REVIEWED.

EPA RESPONSE: THE OPERATION OF METHANE GAS MONITORS WILL NOT BE REVIEWED AT THIS TIME. THESE MONITORS ARE OPERATED BY THE LOCAL SCHOOL BOARD AND A MEMBER OF THE SCHOOL BOARD HAS INFORMED EPA THAT THE MONITORS ARE FULLY FUNCTIONAL.

A CITIZEN ASKED IF THE VENTING SYSTEM DESCRIBED IN THE REPORT WILL RESOLVE THE PROBLEM WITH METHANE GAS, AND WHAT PERIOD OF TIME WILL BE REQUIRED BEFORE ALL THE METHANE GAS IS VENTED OFF?

EPA RESPONSE: THE VENTING SYSTEM WILL, UPON COMPLETION OF CONSTRUCTION, MITIGATE THE METHANE PROBLEMS. VENTING WILL BE PROVIDED OVER THE COURSE OF A TWENTY TO TWENTY-FIVE YEAR PERIOD TO RELEASE METHANE AND OTHER GASES, WHICH WOULD BUILD UP UNDER AN AIRTIGHT CAP. LANDFILLS TYPICALLY GENERATE METHANE GAS FOR THIS TIME PERIOD.

AN ATTENDEE EMPHASIZED THAT THE AQUIFER BENEATH THE LANDFILL SUPPLIES APPROXIMATELY 88 PERCENT OF NASSAU COUNTY'S POTABLE WATER. STATING CONCERN THAT THE RI/FS REPORT DESCRIBED THE LANDFILL AS A SOURCE OF CONTAMINATION, THE ATTENDEE ASKED WHETHER A LONG-TERM PLAN TO MONITOR THE LANDFILL WOULD BE IN EFFECT FOR TWENTY TO TWENTY-FIVE YEARS.

EPA RESPONSE: YES. LONG-TERM MONITORING IS PART OF THE REMEDY.

D. COST AND LIABILITY

A CITIZEN ASKED IF THE TOTAL COST OF THE CLEAN UP IS TWENTY-SIX BILLION?

EPA RESPONSE: NO. THE COST IS PROJECTED AT TWENTY-SIX MILLION DOLLARS.

REFERRING TO PAST PERMIT VIOLATIONS ON THE PART OF CERRO WIRE, AN ATTENDEE ASKED WHETHER CERRO WIRE WOULD BE NAMED IN ANY COST RECOVERY SUIT?

EPA RESPONSE: IT IS UNDECIDED AT THIS TIME WHETHER CERRO WIRE, WHICH IS A PRP AT THIS SITE, WOULD BE NAMED AS A DEFENDANT IN 1 COST RECOVERY SUIT.

E. FUTURE PLANS FOR SITE USE

SEVERAL CONCERNS WERE RAISED REGARDING FUTURE PLANS FOR SITE USE. AN ATTENDEE STATED OPPOSITION TO CAPPING THE SITE FULLY WITH ASPHALT AND ALLOWING IT TO BE USED FOR A PARKING LOT FOR THE LONG ISLAND RAILROAD, OR A SHARED PARKING LOT WITH ANY INDUSTRIAL USER. THE ATTENDEE SUGGESTED THE ALTERNATIVE OF A PARK. THE ATTENDEE EXPRESSED CONCERN THAT NOTHING MORE SHOULD HAPPEN TO THE SITE, OTHER THAN TO CLEAN IT UP AND GRASS IT OVER. OTHER CITIZENS ASKED IF THE CLEANUP PLAN LEAVES THE POSSIBILITY OPEN FOR DEVELOPING THE SITE AS A PARKING LOT IN THE FUTURE, AND WHETHER IT WOULD BE PRUDENT TO CONSTRUCT A RAILROAD STATION COMPLEX WHILE VENTING METHANE GAS FOR THE NEXT TWENTY-FIVE YEARS OR MORE.

FINALLY, A COMMUNITY GROUP WROTE TO EPA STATING THAT IT ENDORSED ALTERNATIVE 2B AS A REMEDIAL MEASURE BUT WERE CONCERNED ABOUT THE POTENTIAL ENVIRONMENTAL IMPACT FROM USE OF THE AREA FOR MASS PUBLIC PARKING.

EPA RESPONSE: EPA HAS NO CONTROL OVER LOCAL LAND USE AS LONG AS IT IS IN CONFORMANCE WITH THE REMEDIATION BEING REQUIRED.

AN ATTENDEE ASKED IF THERE WAS ANY REMEDY THAT COULD HELP ELIMINATE THE CONSTANT RISK TO THE WORKERS OF THE TOWN, THE PEOPLE WHO USE IT, THE CHILDREN WHO GO TO THE SCHOOL, AND THE PEOPLE THAT LIVE ADJACENT TO THE SITE OVER THE NEXT 30 MONTHS TO THREE YEARS WHILE THE CURRENT PROPOSED PLAN IS BEING IMPLEMENTED?

EPA RESPONSE: THERE IS NO EASILY-IMPLEMENTABLE SHORT-TERM REMEDY. THREE YEARS IS AN ACCEPTABLE CONSTRUCTION PERIOD FOR THE CAPPING OF A LANDFILL OF THIS SIZE. IT IS NOT EXPECTED THAT THE HEALTH OF THE PUBLIC WILL BE COMPROMISED OVER THE SHORT DURATION NEEDED TO IMPLEMENT THE REMEDY.

F. FUTURE MEETINGS

AN ATTENDEE ASKED IF THE NEXT PUBLIC MEETING COULD BE HELD IN THE SYOSSET AREA FOR THE CONVENIENCE OF THE RESIDENTS?

EPA RESPONSE: YES.

PART II: COMPREHENSIVE RESPONSE TO SIGNIFICANT COMMENTS

THIS SECTION PROVIDES A COMPREHENSIVE TECHNICAL RESPONSE TO COMMENTS OR QUESTIONS RECEIVED DURING THE PUBLIC COMMENT PERIOD. CONCERNS AND QUESTIONS PRESENTED IN THIS SECTION CONSIST OF TWO CATEGORIES:

- A. HEALTH AND SAFETY
- B. EFFECTIVENESS OF THE PREFERRED REMEDY, AND

A SUMMARY OF THE COMMENTS AND EPA'S RESPONSE TO THEM IS PROVIDED BELOW.

A. HEALTH AND SAFETY

THE TOWN OF OYSTER BAY (THE "TOWN") COMMENTED IN A LETTER TO EPA THAT EPA MADE MATHEMATICAL CONVERSION ERRORS AND INCORRECT ASSUMPTIONS WHICH AFFECT THE REPORTED RISK ESTIMATES FOR THE SITE EVEN THOUGH THE RISK ESTIMATES ARE WITHIN THE US EPA ACCEPTABLE RANGE. THE TOWN EXPRESSED SEVERAL OBJECTIONS, NOTED AS THE USE OF:

- ! INCORRECT SOIL GAS DATA TO CALCULATE RISK EXPOSURES
- ! WELL N-4133 AS THE CLOSEST GROUND-WATER WITHDRAWAL POINT FOR ESTIMATING RISK
- ! ANALYTICAL RESULTS FROM UNFILTERED GROUND-WATER SAMPLES, THEREBY POSSIBLY INCREASING THE LEVELS OF DETECTED ARSENIC BECAUSE OF THE PRESERVATION METHODS USED FOR THE SAMPLES, AND

! A GROUND-WATER TRANSPORT MODEL TO DETERMINE OFF-SITE CONDITIONS.

THE TOWN ALSO OBJECTED TO EPA'S CONCLUSION THAT ALL WELLS WITHIN A ONE-MILE RADIUS OF THE SITE MAY BE AFFECTED BY THE SITE. THE TOWN STATED THAT, AS ADDRESSED IN THE ENDANGERMENT ASSESSMENT (EA), THE ABOVE ISSUES HAVE RESULTED IN AN UNREALISTICALLY HIGH ASSESSMENT OF THE POTENTIAL RISKS ASSOCIATED WITH THE SITE. THE TOWN REQUESTED REVISION OR RETRACTION OF THE EA.

EPA RESPONSE: EPA RESPONDED TO THE TOWN'S COMMENTS PRIOR TO ISSUANCE OF THE PROPOSED PLAN AND MADE APPROPRIATE CHANGES TO THE EA.

! THE MATHEMATICAL CORRECTION ERROR, WHICH INVOLVED CONVERSION OF RAW SOIL GAS DATA INTO THE CORRECT UNITS, WAS CORRECTED IN THE EA.

! WELL N-4L33 WAS CONSIDERED AS A POTENTIAL SOURCE OF EXPOSURE TO THE WATER SUPPLY BECAUSE IT WAS IN USE DURING PART OF THE LANDFILL OPERATION PERIOD. BECAUSE THE WELL LIES DIRECTLY IN THE FLOW PATH OF GROUNDWATER LEAVING THE SITE, AND IT WAS USED AS A SOURCE OF POTABLE WATER, IT IS CONSIDERED TO BE INDICATIVE OF THE GENERAL CONDITION OF THE LOCALIZED AQUIFER. THIS ASSUMPTION IS APPROPRIATELY CONSERVATIVE AND PROTECTIVE OF HUMAN HEALTH. ALTHOUGH ALL WELLS WITHIN A ONE-MILE RADIUS OF THE SITE WERE CONSIDERED TO BE POTENTIALLY AFFECTED BY THE SITE, ONLY WELL N-4133 WAS USED IN THE FINAL RISK ANALYSIS BECAUSE IT WAS REPRESENTATIVE OF THE QUALITY OF THE LOCALIZED AQUIFER WITHIN A REASONABLE DISTANCE FROM THE SITE AND WITHIN THE MOST LIKELY FLOW PATH FOR GROUNDWATER.

! USING UNFILTERED GROUND-WATER SAMPLES FOR THE METALS ANALYSIS IS CONSERVATIVE IN ITS PROTECTION OF HUMAN HEALTH. OFF-SITE SAMPLING DATA WERE NOT USED TO CALIBRATE THE GROUND-WATER MODEL EMPLOYED IN THE RISK EVALUATION BECAUSE THIS DATA DOES NOT EXIST YET. MODELING OF THE POTENTIAL MOVEMENT OF CONTAMINANTS IN THE AQUIFER WAS PERFORMED TO PROVIDE A CONSERVATIVE ESTIMATE OF THE QUALITY OF THE AQUIFER IN OFF-SITE LOCATIONS. FOR FURTHER DETAILS ON THE ISSUES OUTLINED ABOVE, THE READER CAN CONSULT THE EA, WHICH IS CONTAINED IN THE SITE ADMINISTRATIVE RECORD AT THE INFORMATION REPOSITORIES.

B. EFFECTIVENESS OF THE PREFERRED REMEDY

A CONSULTING FIRM REPRESENTATIVE WROTE TO EPA AND OBJECTED TO THE PREFERRED ALTERNATIVE OF CAPPING THE LANDFILL AND RECOMMENDED ADDITIONAL STUDY OF THE FEASIBILITY OF OTHER TECHNOLOGIES, SUCH AS:

! BIODEGRADATION OF ORGANIC MATERIALS IN THE LANDFILL, EMPHASIZING AEROBIC DEGRADATION

! BIODEGRADATION OF HYDROCARBONS IN THE LANDFILL

! REMOVAL OF METALS BY ELECTROLYTICAL OR SOLIDIFICATION PROCESSES

! PLASMA INCINERATION OF OTHER CHEMICAL COMPOUNDS

! REMOVAL AND TREATMENT OF LEACHATE, OR

! OTHER FORMS OF SOIL AND GROUNDWATER TREATMENT.

THESE ACTIONS ARE INTENDED TO REMEDIATE SUB-SURFACE SOIL CONTAMINATION AND GROUND-WATER CONTAMINATION. THE WRITER ALSO ADVISED EPA THAT BY USING ONE OF THESE ALTERNATIVE METHODS, A PORTION OF THE CLEANUP COST COULD BE RECOVERED AS THE LAND VALUE APPRECIATES OVER TIME. OTHER COST AND ENERGY SAVING METHODS WERE SUGGESTED AS PART OF THE CLEANUP, INCLUDING THE ESTABLISHMENT OF AN ON-SITE LABORATORY, USE OF WIND POWER TO DRIVE GROUND-WATER PUMPS, AND THE USE OF SOLAR RADIATION AND WIND TO EVAPORATE GROUNDWATER AS A PART OF THE TREATMENT SCHEME. MODIFICATION OF THE PROPOSED CAPPING SCHEME WAS ALSO SUGGESTED, INCLUDING INJECTION OF SEALANTS TO PREVENT LATERAL MOVEMENT OF LEACHATE FROM THE CORE OF THE LANDFILL.

EPA RESPONSE: THE FEASIBILITY STUDY (FS) FOCUSED ON THE FOLLOWING EXPOSURE ROUTES:

- ! POTENTIAL IMPACTS CAUSED BY INHALATION OF VOCs FROM ON-SITE SOILS
- ! DIRECT SKIN CONTACT WITH ON-SITE SOILS, AND
- ! ON-SITE MEASURES TO REDUCE FUTURE LEACHATE GENERATION.

REMEDICATION OF THE SUB-SURFACE SOILS VIA THE SUGGESTED METHODS WOULD REDUCE THE POTENTIAL IMPACT OF THE FIRST TWO ROUTES. BOTH REMOVAL OF SUB-SURFACE SOILS AND SUBSEQUENT TREATMENT OF THOSE SOILS BY INCINERATION OR CHEMICAL OR BIOLOGICAL IN-SITU TREATMENT WERE IDENTIFIED IN THE FS. EPA SCREENED OUT THE FIRST TECHNOLOGY BECAUSE OF HIGH COST AND THE SECOND BECAUSE IT WOULD BE INEFFECTIVE AT THE LOW CONTAMINANT CONCENTRATIONS WHICH ARE CHARACTERISTIC OF THE SITE. THESE TECHNOLOGIES WERE NOT CONSIDERED FURTHER. THE EFFECTS OF ON-SITE REMEDIATION ON POTENTIAL OFF-SITE PATHWAYS, SUCH AS GROUNDWATER, ALSO WERE ADDRESSED IN THE FS. FURTHER DELINEATION OF THE OFF-SITE CONTAMINATION AND THE POTENTIAL RISK DERIVED FROM THIS CONTAMINATION, WILL BE EVALUATED IN THE SECOND OPERABLE UNIT RI/FS. REMEDIAL PLANS FOR THIS EXPOSURE PATHWAY HAVE, THEREFORE, NOT BEEN COMPLETED.

#TA

TABLE 10
CALCULATION OF NONCARINOGENIC SUBCHRONIC HAZARD INDEX

CHEMICAL	INHALATION		ORAL	
	RFD	HI	RFD	HI
ARSENIC	NA		1.00E-03	2.11E+00
BARIUM	1.00E-03	NA	5.00E-02	1.54E-01
ZINC	NA	NA	2.00E-01	3.04E-01
BENZENE	NA	NA	NA	NA
CHLOROBENZENE	5.00E-02	2.80E-02	2.00E-01	2.17E-03
CHLOROFORM	NA	NA	1.00E-02	2.10E-02
METHYLENE CHLORIDE	8.57E-01	4.21E-04	6.00E-02	4.85E-04
BIS(2-ETHYTHEXYL)				
PHTHALATE	NA	NA	2.00E-02	1.99E-02
TETRACHLOROETHENE	NA	NA	1.00E-01	2.22E-03
TOLUENE	2.00E+00	2.25E-04	4.00E-01	7.27E-05
TRICHLOROETHENE	NA	NA	NA	NA
VINYL CHLORIDE	NA	NA	NA	NA
HAZARD INDEX:		2.87E-02	HAZARD INDEX:	2.61E+00

TABLE 10B
CALCULATION OF CHRONIC HAZARD INDEX

CHEMICAL	INHALATION		ORAL	
	RFD	HI	RFD	HI
ARSENIC	NA	NA	1.00E-03	1.17E-01
BARIUM	1.00E-04	NA	5.00E-02	1.87E-02
ZINC	NA	NA	2.00E-01	1.11E-02
BENZENE	NA	NA	NA	NA
CHLOROBENZENE	5.00E-03	9.96E-03	2.00E-02	1.10E-03
CHLOROFORM	NA	NA	1.00E-02	1.69E-03
METHYLENE CHLORIDE	8.57E-01	1.91E-05	6.00E-02	3.09E-04
BIS(2-ETHYTHEXYL)				
PHTHALATE	NA	NA	2.00E-02	3.86E-03
TETRACHLOROETHENE	NA	NA	1.00E-02	1.906E-03
TOLUENE	2.00E+00	4.34E-05	3.00E-01	6.04E-05
TRICHLOROETHENE	NA	NA	NA	NA
VINYL CHLORIDE	NA	NA	NA	NA
HAZARD INDEX:		1.00E-02	HAZARD INDEX:	1.56E-01

TABLE 10C
CALCULATION OF ADULT NONCARINOGENIC SUBCHRONIC HAZARD INDICES

CHEMICAL	INHALATION		ORAL	
	RFD	HI	RFD	HI
ARSENIC	NA	NA	1.00E-05	7.56E-01
BARIUM	1.00E-03	NA	5.00E-02	5.54E-02
ZINC	NA	NA	2.00E-01	1.09E-01
BENZENE	NA	NA	NA	NA
CHLORBENZENE	5.00E-02	2.04E-02	2.00E-01	7.79E-04
CHLOROFORM	NA	NA	1.00E-02	7.55E-03
METHYLENE CHLORIDE	8.57E-01	2.97E-04	6.00E-02	1.74E-04
BIS(2-ETHYTHEXYL)				
PHTHALATE	NA	NA	2.00E-02	7.13E-03
TETRACHLOROETHENE	NA	NA	1.00E-01	7.97E-04
TOLUENE	2.00E+00	1.72E-04	4.00E-01	2.61E-05
TRICHLOROETHENE	NA	NA	NA	NA
VINYL CHLORIDE	NA	NA	NA	NA
HAZARD INDEX:	2.09E-02		HAZARD INDEX:	1.81E-01

TABLE 10D
CALCULATION OF ADULT CHRONIC HAZARD INDEX
SCHOOL CHILDREN

CHEMICAL	INHALATION		ORAL	
	RFD	HI	RFD	HI
ARSENIC	NA	NA	1.00E-03	4.19E-02
BARIUM	1.00E-04	NA	5.00E-02	6.72E-03
ZINC	NA	NA	2.00E-01	3.99E-03
BENZENE	NA	NA	NA	NA
CHLORBENZENE	5.00E-03	8.37E-03	2.00E-02	3.93E-04
CHLOROFORM	NA	NA	1.00E-02	6.05E-04
METHYLENE CHLORIDE	8.57E-01	1.52E-05	6.00E-02	1.11E-04
BIS(2-ETHYTHEXYL)				
PHTHALATE	NA	NA	2.00E-02	1.38E-03
TETRACHLOROETHENE	NA	NA	1.00E-02	6.81E-04
TOLUENE	2.00E+00	3.74E-05	3.00E-01	2.17E-05
TRICHLOROETHENE	NA	NA	NA	NA
VINYL CHLORIDE	NA	NA	NA	NA
HAZARD INDEX:	8.42E-03		HARZARD INDEX:	5.58E-02

TABLE 11A
RISK ESTIMATES FOR CARCINOGENS
SCHOOL CHILDREN

CHEMICAL	EXPOSURE	CARCINOGENIC POTENCY FACTOR	ROUTE SPECIFIC	TOTAL CHEMICAL-SPECIFIC
	ROUTE	1 / (MG/KG/DAY)	RISK	RISK
ARSENIC	ORAL	1.80E+00	1.97E-05	1.97E-05
	INHALATION	5.00E+01	NA	
BARIUM	ORAL	NA	NA	NA
	INHALATION	NA	NA	
ZINC	ORAL	NA	NA	NA
	INHALATION	NA	NA	
BENZENE	ORAL	2.90E-02	3.78E-08	8.11E-08
	INHALATION	2.90E-02	4.33E-08	
CHLOROBENZENE	ORAL	NA	NA	NA
	INHALATION	NA	NA	
CHLOROFORM	ORAL	6.10E-03	9.64E-09	1.30E-07
	INHALATION	8.10E-02	1.21E-07	
METHYLENE	ORAL	7.50E-03	1.30E-08	1.30E-08
CHLORIDE	INHALATION	4.70E-07	9.24E-13	
BIS(2-ETHYTHEXYL)	ORAL	1.40E-02	1.01E-07	1.01E-07
PHTHALATE	INHALATION	NA	NA	
TETRA	ORAL	5.10E-02	9.07E-08	9.07E-08
CHLOROETHENE	INHALATION	3.30E-03	NA	
TOLUENE	ORAL	NA	NA	NA
	INHALATION	NA	NA	
TRICHLOROETHENE	ORAL	1.10E-02	1.70E-08	1.70E-08
	INHALATION	1.70E-02	NA	
VINYL CHLORIDE	ORAL	2.30E+00	4.00E-06	5.14E-06
	INHALATION	1.95E-01	1.14E-06	
TOTAL UPPER BOUND RISK=				2.53E-05

TABLE 11B
RISK ESTIMATES FOR CARCINOGENS
ADULTS

CHEMICAL	EXPOSURE	CARCINOGENIC POTENCY FACTOR	ROUTE SPECIFIC RISK	TOTAL CHEMICAL-SPECIFIC RISK
ARSENIC	ORAL	1.80E+00	2.91E-05	2.19E-05
	INHALATION	5.00E+01	NA	
BARIUM	ORAL	NA	NA	NA
	INHALATION	NA	NA	
ZINC	ORAL	NA	NA	NA
	INHALATION	NA	NA	
BENZENE	ORAL	2.90E-02	5.59E-08	1.12E-07
	INHALATION	2.90E-02	5.57E-08	
CHLOROBENZENE	ORAL	NA	NA	NA
	INHALATION	NA	NA	
CHLOROFORM	ORAL	6.10E-03	1.43E-08	2.55E-07
	INHALATION	6.10E-02	2.41E-07	
METHYLENE	ORAL	7.50E-03	1.93E-08	1.93E-08
CHLORIDE	INHALATION	4.70E-03	2.28E-12	
BIS(2-ETHYTHEXYL)	ORAL	1.40E-02	1.50E-07	1.50E-07
PHTHALATE	INHALATION	NA	NA	
TETRA	ORAL	5.10E-02	1.34E-07	1.56E-07
CHLOROETHENE	INHALATION	3.30E-03	2.16E-08	
TOLUENE	ORAL	NA	NA	NA
	INHALATION	NA	NA	
TRICHLOROETHENE	ORAL	1.10E-02	2.51E-08	3.55E-08
	INHALATION	1.70E-02	1.04E-08	
VINYL CHLORIDE	ORAL	2.30E+00	5.91E-06	6.59E-06
	INHALATION	2.95E-01	6.79E-07	
TOTAL UPPER BOUND RISK=				3.65E-05

NA=NOT AVAILABLE OR NOT APPLICABLE